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Table of Contents.

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	Page.
ORIGINAL ARTICLES—	
The Anne MacKenzie Oration, by Frank S. Hone, B.A., M.B., B.S.	357
Protein Deficiency and the Use of Human Serum in its Treatment, by James Isbister	362
REPORTS OF CASES—	
Tick Typhus in South Queensland: Report of Three Cases, by G. E. W. Streeten, R. S. Cohen, N. M. Gutteridge, N. B. Wilmer, H. E. Brown, D. J. W. Smith and E. H. Derrick	372
REVIEWS—	
The Mental Growth of the Child	374
The Borderland of Psychiatry and Medicine	374
Surgery in Synopsis	374
Physical Diagnosis	374
La Douleur	374
Diseases of Children	375
Practical Clinical Psychiatry	375
A Synopsis of Hygiene	375
Experimental Physiology	376
NOTES ON BOOKS, CURRENT JOURNALS AND NEW APPLIANCES—	
The Surgical Clinics of North America	376
The Medical Clinics of North America	376
Work at the Mayo Clinic	376
A Year Book of Diagnosis and Treatment	376
Illustrations of Regional Anatomy	376
LEADING ARTICLES—	
Pity	377
CURRENT COMMENT—	
Prognosis in Hypertension and Associated Conditions	378
Sensitivity to Penicillin	378
Mortality from Acute Appendicitis	379
ABSTRACTS FROM MEDICAL LITERATURE—	
Surgery	380
MEDICAL SOCIETIES—	
Melbourne Pædiatric Society	382
SPECIAL CORRESPONDENCE—	
New Zealand Letter	385
CORRESPONDENCE—	
The Treatment of Psychoses and Psychoneuroses by Electroplexy (Electric Shock Therapy) in a General Hospital	386
Prominence of the Eyes in Father and Daughter	386
Standards at the University of Sydney Medical School	386
A Basic Routine for Post-Operative Treatment after Laparotomy	386
POST-GRADUATE WORK—	
The Post-Graduate Committee in Medicine in the University of Sydney	387
AUSTRALIAN MEDICAL BOARD PROCEEDINGS—	
Queensland	387
UNIVERSITY INTELLIGENCE—	
The University of Melbourne	388
OBITUARY—	
Leon Opit	388
Bernard Moore Sampson	388
NOMINATIONS AND ELECTIONS	388
BOOKS RECEIVED	388
DIARY FOR THE MONTH	388
MEDICAL APPOINTMENTS: IMPORTANT NOTICE	388
EDITORIAL NOTICES	388

The Anne MacKenzie Oration.[1]

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THE Anne MacKenzie Oration was founded in 1929 by the late Sir Colin MacKenzie. Not only was its establishment a mark of filial devotion on his part, but in laying down the conditions for its delivery he showed his intense and abiding interest in the prevention of disease and in recent discoveries of medical science. That interest had already been displayed in his study of the marsupials and their musculature, in his collection of anatomical specimens that illustrated the truths he desired to emphasize, and in his presentation of his collection to the nation, by whom it is now housed in the Australian Institute of Anatomy in this capital. His life is an illustration of what can be done by a single-minded devotion to one subject. His death in 1938 robbed the medical profession of an enthusiast honoured in his special branch of study. But it was even then becoming apparent that attention was being shifted from the importance of anatomical and muscular function to that of physiological and biochemical function, and this has continued with ever-increasing emphasis in the Australian Institute of Anatomy, which has become the Australian centre for research on human nutrition.

A similar incipient change of viewpoint was revealed in the last of these orations, which was delivered in 1940. The founder of the oration had emphasized attention to methods that should be adopted for the improvement of the body. Yet in 1940 Dr. Harold Ritchie took as his subject the interaction of body and mind, and the increasing recognition of the importance of mind in the prevention of body disease is shown by the extensive use of that American term "psychosomatic". And if preventive medicine is a living, vital thing, such changes must inevitably occur.

Until I saw the Canti film I had always conceived of periosteum and bone as relatively inert and static. Yet that film revealed incessant activity in the cells of the periosteum, and that change of outlook has during the past ten years penetrated to all departments of medicine, so that today we no longer think of deposits of fat as static and permanent, but as the seat of incessant change. This dynamic rather than the old static conception has permeated all our medical thought and has been emphasized by the revelations of the electroencephalograph.

A similar change of emphasis is noticed when we consider a condition which annually becomes the greatest of medical problems—the different manifestations of what we term cancer. Although it is becoming increasingly recognized to be a mistake to regard this as a disease only of old age, yet the disease is more and more coming to the fore as our chief medical problem, as our birth rate falls and the average age of our population increases. So that today it is true that one out of every eight of this present audience is probably doomed to die from that cause.

When this oration was first established the possibilities of radiotherapy as an alternative method to surgery in the treatment of cancer were being emphasized and popularized by the Commonwealth's purchasing and distributing radium to the various Australian States on a scale hitherto undreamt of. As a result of this, various forms of radiotherapy have been standardized and perfected in our country, the dangers explored, the limitations better understood and the pathological changes investigated from all angles.

But whereas attention was then chiefly devoted to pathological changes, the emphasis, especially in regard to probable causation, has tended to shift to the biochemical side, as cell growth and cell nutrition have become better understood. In addition, the close relationship between carcinogenic substances and sex hormones is now realized. The production of isotopes has opened up new fields and

[1] Delivered at Canberra on November 27, 1947.

hopeful avenues of treatment, though as yet we cannot say that they are more effective than X rays and the radium bomb or other forms of radiotherapy. But in spite of all the endeavours of trained and eager individuals, teams and institutions all over the world, in his most recent pronouncement in *The British Medical Bulletin* (July, 1947) Professor Haddow states that there can be no misunderstanding as to the almost insuperable problems which the chemotherapy of cancer presents and which "in search of a comparison, we can almost liken to the biological counterpart of the squaring of the circle". Yet in commenting on some remarks made by Professor Walsh in 1846 (just a hundred years ago), he states that the slight advances of the last few years were more than those ever accomplished before, but that it is to be feared that the problem is more formidable than even Walsh believed. These changes of emphasis run throughout the whole domain of medicine, and are proof, if proof were needed, of its being not a static condition but a living force.

> The old order changeth, yielding place to new,
> And God fulfils himself in many ways,
> Lest one good custom should corrupt the world.

Nonetheless the main purpose of this oration remains the same as when it was founded—to discuss means for preventing or diminishing diseases and disabilities in the human body, by the study of preventive measures, and also by familiarizing the general public with recent discoveries in medical science and with the methods which should be adopted for the improvement of the efficiency of the body. From the time of the delivery of the first of these orations in 1929 until war conditions interrupted the programme in 1940, different aspects of the subject were emphasized by various leaders of the medical profession. The resumption of the oration this year is further evidence of the way in which we are gradually resuming our normal national life and taking up more of these community activities which were dislocated and interrupted by the war. In the interval two events of importance have occurred in the field that is the immediate concern of this gathering, which serve to illustrate at the same time the changing emphasis to which I have been referring and the futility of human planning. I refer to the retirement in 1945 of Dr. J. H. L. Cumpston as Commonwealth Director-General of Health, and the tragic and untimely death subsequently of Dr. Frank McCallum, whom we had all looked upon, by his gifts and training, as his natural successor. As I think of the last time I saw Frank McCallum, when he made his first appearance as chairman of the council of the School of Public Health and Tropical Medicine, and remember his eager interest, his scheme for future developments, and his plans to fly back to Canberra that night to begin to put them into operation, and then how I heard of his being in hospital two days later, stricken with an illness that ultimately proved fatal, I think his story is the perfect example of the man commemorated in Milton's famous lines in "Lycidas", brought up

> To scorn delights, and live laborious days:
> But the fair guerdon when we hope to find,
> And think to burst out into sudden blaze,
> Comes the blind Fury with the abhorred shears,
> And slits the thin-spun life.

Dr. Cumpston, on the other hand, had directed activities for the promotion of health and the prevention of disease within the Commonwealth since 1912—for the first ten years as Director of Quarantine and since 1922 as Director-General of Health. One has only to look back—as a few of us can still do—to the condition of affairs when he first took up office, to realize the tremendous advances in preventive measures in Australia that have occurred during that period, largely owing to his inspiration, industry and foresight. I think we are still too close to him to realize fully our good fortune in having as our first director-general of health a man of such wide vision and enthusiasm, combined with such a capacity for work and care in detail. As I have been compelled in preparing this address to study and reflect on happenings in public health in Australia between the beginning of World War I and the present (a period which roughly corresponds with Dr. Cumpston's tenure of office), I have realized that he and the men of his generation were occupied in laying down foundations, often with imperfect human tools and inadequate administrative machinery and equipment, yet gradually affording a solid basis for future activities, the enduring value of which has become more and more evident as they have been tested in war and in peace. The establishment of the Commonwealth Serum Laboratories in Melbourne, with their offshoots as a chain of diagnostic laboratories in the different States, the building up of a Commonwealth Quarantine Service, the School of Public Health and Tropical Medicine in Sydney, with its proposed out-stations in New Guinea and elsewhere, the Australian Institute of Anatomy in this capital city, the foundation of the National Health and Medical Research Council, and the institution of the Lady Gowrie pre-school clinics, to mention only a few of these ever-expanding activities, will illustrate what I mean.

As wo resume these annual orations I could wish that someone with a more thorough scientific training and a wider educational background could elaborate the theme outlined by our founder for the study of preventive measures and for familiarizing the general public with recent discoveries. I am heartened by the thought that this is a lay audience to whom my shortcomings may not be so apparent as they would be to my professional colleagues.

In order to clarify issues I think it is well for us tonight to limit our attention to matters which have occurred since the establishment of this oration, and especially to those which have occurred since war interrupted the series.

Even in this limited period the range of material for such an address is tremendous, and the change in outlook is so great that it is difficult for one brought up like myself, in the old atmosphere, to accommodate himself to it. Whilst the terms of reference show that "the whole world is my parish", it necessarily follows that in this utterance, which marks the beginning of a new epoch, our vision must be particularly centred on our own land and our nation. As one also who, from his early manhood or perhaps earlier, has been emphatic on the necessity for a national outlook, I have become increasingly conscious of the difficulties in arriving at a truly Australian viewpoint. Geographical and climatic conditions necessitate that the eastern seaboard must always be the most fertile and most densely populated part of the continent, and this can easily lead to a local over-emphasis that militates against a truly Australian viewpoint. Yet we must never mistake Canberra-wealth for Commonwealth. The problems of health are just as pressing amongst the scatterered white and aboriginal population of Central Australia as in the overcrowded quarters of Melbourne and Sydney, and if I was asked to name one of the most striking and important recent advances in preventive medicine, I should point to the Flying Doctor Service operating in outback Australia. These statements are made as a preliminary to clear the ground for our discussion. It is quite evident to all of us that we are at the beginning of a new epoch, in which our old sense of values has been destroyed and new standards are set up. For the present at any rate self-interest instead of service is the dominant factor in many folks' lives. And it is that change of outlook which is harassing many of the older generation like myself. It must pass, because it is self-destructive, but in the passing it may damage and scar our national life. In this address one must necessarily exclude politics; they are foreign to the spirit of the foundation. Yet the atmosphere of distrust which is the inevitable sequel to the pursuit of self-interest has so permeated all community life that anything one says on any aspect of health is thought to have a political aspect—either "for or agin the government".

For instance, those of us who have for years fought for the value of prevention rather than of remedial measures as the keynote to modern medical ideas cannot but oppose proposals to substitute medical benefits for preventive benefits. And the medical profession as a whole, since the presidential address of the late Sir George Syme in 1923, has become so imbued with these preventive ideals that

its members unconsciously act on this in giving anti-tetanus injections when a wound is received, and in the campaigns, which are now almost universal, for the immunization of children against diphtheria.

I am glad, therefore, in what is probably my swan-song, to aid the late Sir Colin MacKenzie in reemphasizing the importance of prevention and in popularizing recent advances in this sphere. But the difficulty straight away presents itself as to what may be called "recent". In our proud boasts in the past century of man's so-called conquest of Nature, it came as a humbling experience to find that on the Greek side of our culture Plato's "Republic", some 600 years B.C., outlined the principles of these nursery schools on which we have been priding ourselves as a new thing, while on the Hebrew side we have only to turn to the wisdom books of Job and Solomon to see that two thousand years ago these thinkers were facing exactly the same fundamental questions as ourselves. The difference is that they theorized only and that we have learnt to put our theories to the test of experiment and learn by experience. And as experiment and education have thus become the basis of all recent advances in preventive medicine, I am making this the main theme of this address, particularly in relation to what has happened in the last six years.

Quite early in my professional career I had the good fortune to read the life of John Hunter. He, as you know, is known as the father of English surgery. He was the originator of the Hunterian Museum in London, which served as the inspiration and model for our local Institute of Anatomy. Jenner, who subsequently discovered and demonstrated the efficiency of vaccination against smallpox, was one of his favourite pupils, and started practice in the middle of the eighteenth century as an obscure country practitioner who was constantly sending to Hunter specimens for his museum and questioning him on difficulties he met with. And in reply to one such letter Hunter wrote to him: "Do not think, try, be patient, be accurate." This experimental method with this saying as its keynote was the basis of the investigation by Jenner that subsequently resulted in the campaign for vaccination against smallpox in 1797 and in its general acceptance in 1807. This was for nearly one hundred years the only such method for protection against any infectious disease, till inoculation against infection with rabies was introduced by Pasteur; this was followed by antityphoid inoculation early in the present century. But these experiments and their successes had to be followed by education of the medical profession and of the general public and official authorities. Further, these experiments had to be continued, first of all in regard to vaccination itself, so that we might learn the true relation between cowpox and smallpox, the limitations of the method and the safeguards necessary. These experiments were then continued with regard to other diseases, so that this year wives and children of our occupational forces in Japan, going to join the male members of their families, have been vaccinated not only against smallpox, but also against diphtheria, typhoid and paratyphoid fever A and B, tetanus, typhus and cholera.

The same principles are true of advances in surgical practice. When I graduated in 1894 the fight to introduce antiseptic methods had just begun. Some years ago I heard one of my colleagues relate how he himself had heard the master mind Lister say: "I read an interesting article last night by a Frenchman on fermentation, and I am going to try an experiment." That experiment was successful and gradually the principles of antisepsis and later asepsis permeated the whole of surgical practice by a process of educating successive generations of medical students and nurses. The same experimental methods accompanied the introduction of the various sulphonamide compounds, and the still more dramatic accidental discovery of penicillin, which was followed by patient and persistent experimental work.

The accompanying educational programme is actively continued today in our teaching hospitals, so that the practising doctor, in his daily round, uses preventive measures in an almost subconscious way, and the appreciation of the necessity for these measures by the lay mind is shown by the casualty and first-aid organizations which are now part and parcel of the modern industrial set-up.

When the recent war began our main concern in public health lay in attempts at control of the infections of temperate climates. Our home hygiene was largely inherited from the traditions of our ancestors, who had migrated from temperate climates. Only in Queensland and in northern Australia had we begun to make a stand against tropical problems of housing and ventilation. In these areas also we met with occasional outbreaks of dengue fever and malaria. We had successfully fought battles to prevent the introduction from overseas on any large scale of smallpox, bubonic plague and such tropical diseases. In our own land, even with infections, our main preoccupation had been the subjugation of insanitary diseases like typhoid fever and its near relations, of school diseases like diphtheria, of economic diseases like tuberculosis, and of social diseases like syphilis and gonorrhœa. The last war had been fought overseas. We had heard tales of the toll in that war of typhoid fever and the dysenteries in Gallipoli, and of malaria in the Jordan Valley, and of bilharziasis in Egypt; but these had not affected us as a whole. In civilian life we learnt later that we had odd cases of murine typhus fever appearing from time to time in our midst, we read of forms of scrub typhus occurring down the east coast of Asia, we recognized that in Queensland we had a variety of infections that we lumped together as "coastal fevers", and these we were slowly elucidating, but that was practically all.

But with this war the picture changed entirely, and especially with the entrance of Japan into the war. Instead of malaria and dysentery affecting only our troops in the Middle East, we found them on our doorstep. Fortunately we had been prepared to a certain extent by experience in the last war and had been fortified by the very determined campaign against dysentery and its kindred infections carried out in the Middle East in the first year of the recent war. It was fortunate for us that our medical organization had this twelve months' preliminary training. Under the leadership of Brigadier N. Hamilton Fairley, definite procedures had been laid down and practised against malaria, and through him, owing to his eminence in this field, the medical officers of the Australian Imperial Force were amongst the first people to receive supplies of sulphaguanidine for research purposes in dysentery. But these measures were mainly for treatment, though later the combination of chemotherapy and sanitation measures proved the keystone to success in prevention.

It is no secret that at the first landing at Milne Bay 90% of our troops went down with malaria. It is no secret that much of our early trouble in the Kokoda Trail was due to the inroads of dysentery, which were checked by the revolutionary procedure of sending by air across the Owen Stanley Ranges packets of sulphaguanidine, with instructions to the troops to use them as routine measures on their own initiative in the forward lines. So that it has been claimed that the success of that campaign was largely due to the fact that our troops had supplies of these remedies and that the Japanese did not. But these were primarily remedial and not preventive measures, whereas the main emphasis of this address is laid down as preventive measures—an entirely different story.

For malaria this involved, in addition to the systematic use of "Atebrin" (and in the last year or two of "Paludrine"), the clearing of swamps and the most meticulous care in the proper disposal of garbage and refuse; for dysentery it meant the introduction on a large scale of incinerator latrines known as "the flaming horrors", in place of the open latrines previously in vogue. For the prevention of scrub typhus—an entirely new problem for us—the searching out of possible endemic foci of the mite vector, the extensive spraying of scrub with the newly discovered D.D.T., and for personnel the saturation of clothing with dibutylphthalate or dimethylphthalate. This meant endless experimenting as to the most effective method of introducing and maintaining these procedures, and then the persistent education of troops, of medical

officers and of commanding officers as to the stern necessity of discipline in carrying out these measures. Such education is easier in an army under military control than in a civilian population, and the problem now before us is how to educate the public so that these measures will be popularized and made universal in a civilian community when threatened with these diseases. And this involves discipline that is as yet almost unknown in our civilian life, as is evident when we reflect on the present position in the campaigns in civil life against tuberculosis and syphilis and gonorrhœa.

One of the most striking advances as the result of these war experiences has been the clarification of our knowledge regarding the typhus group of infections. Louse-borne typhus, that scourge of old-world wars in the past, did not occur. The murine type, which is spread by the rat-flea, played an insignificant part; the mite-borne form, which we had thought to be mainly a problem of eastern Asia, was found to be a major problem throughout New Guinea, in the adjacent islands and in northern Queensland; and finally by the researches of the army medical staff the tick-borne type was found to be prevalent in certain parts of Queensland, though fortunately in a much milder form than Rocky Mountain spotted fever or San Paolo fever, which are now found to be the same disease.

Still more interesting is the story of "Q" fever, a rickettsial disease first described by Derrick, of Brisbane, in 1937 as occurring in southern Queensland among men in contact with livestock, and more lately discovered to exist also in northern Queensland. After Derrick's description and its identification as being due to *Rickettsia burneti*, a similar outbreak occurred in Montana (United States of America) and later in Texas, and it has now been proved to be the same disease as one known for many years in southern Albania and southern Europe, which was the cause of at least one epidemic amongst the troops in southern Italy during the recent war. All these diseases are due to infection with different forms of the organism known as rickettsia, and the intensive study of these has led to a great increase in our knowledge of rickettsia-borne diseases throughout the world. This study has opened up a new field in regard to infection and has linked up throughout the world various fevers previously known under different names and supposed to be unrelated. The rickettsiæ are a type of organisms quite separate from the spirochætes, bacilli and cocci, with which we had been familiar. They can exist only in living cells. They are parasites on different arthropods, through whom they convey their specific disease to man; they are highly infectious—so much so that they have proved a frequent cause of disease in laboratory workers; they occupy an intermediate place between the better-known bacilli and the viruses which have attracted so much attention of recent years. Attempts at prevention by vaccines have not been very successful, and the most useful mode of attack at present has proved to be the attack on the louse or mite or tick which is the vector of the disease.

The spread of knowledge concerning them and the diseases which they carry has intensified the study of the viruses, of which some authorities believe the rickettsia to be a special group. These are the smallest living organisms known, most of them too small to be seen with the microscope, so that there has been much controversy as to whether they are living organisms or simply protein molecules. Like the rickettsiæ, they can live and grow only within living cells; they will pass through filters that hold back bacteria, hence the two terms "ultramicroscopic viruses" or "filter-passing viruses". They are the causative organisms of smallpox, chickenpox, measles, German measles, influenza, poliomyelitis and various forms of encephalitis. With most of them we have so far been unable to evolve a procedure that can be depended upon to limit the spread of these infections. The notable exception is smallpox.

When the dysenteries, malaria and scrub typhus threatened to break down our armies in New Guinea, we fell back on experiment in an uncharted realm, and with what success our army records show. But these were food-borne or insect-borne diseases, and by the use of insecticides we were able to subdue these foci.

But with the virus infections the problem is quite different. Only in three virus diseases—dengue fever, sandfly fever and yellow fever—is there any known insect intermediary. In all others we know of no dietary or insect vehicles of infection that we can attack, thus blocking the passage of infection; there are no means so far known to detect possible carriers of infection. As was stated above, our earliest success in protective immunization was in one member of this group—smallpox. Experiments still proceed for immunization methods in influenza and for the use of convalescent serum and γ globulin in measles for the control of the disease occurring in young children, who are the most likely to suffer serious consequences. But the pandemic of influenza in 1918-1919 and the extensive poliomyelitis epidemic in Australia in 1937-1938 have shown us how little we know of the way in which to stop the spread of epidemics of such virus diseases. And that is because as yet we know so little of the life history of these organisms.

The controversy still goes on as to the portal of entry of the virus of poliomyelitis and as to the mode of infection; the hopes that were roused in 1930 as to the protective value of injection of convalescent serum have proved fallacious. Early diagnosis has improved greatly, so that many mild cases were recognized and the patients treated in the last epidemic that had been missed before, and early and continued immobilization and hospital treatment in the acute stages, and orthopædic out-patient treatment during convalescence have produced results in restoring victims to health and economic usefulness that would have been undreamed of fifteen years ago, and have put to shame all the vaunted claims of non-orthodox practitioners.

These results were made plain in a paper by E. F. West and Lois Davison, published in THE MEDICAL JOURNAL OF AUSTRALIA on June 28, 1947, which embodied the results of the reexamination of over 100 patients treated in South Australia years previously, in the 1937 epidemic. The writers state that it is "satisfactory to note that all but one of the patients either are earning their own living or will be able to do so after leaving school".

But, although we have not yet learnt how to prevent the spread of these infections, yet in regard to the after-effects of poliomyelitis, concentration on experiment and education has led to quite unexpected results in the prevention of disabilities. In 1926 the late Dr. R. H. Todd, as a member of the National Royal Commission of Health, called attention to the work on behalf of crippled children then being undertaken in America. At that time no concerted efforts were being made anywhere in Australia to deal with this problem. But since then experiment and education have led to the formation in each State of a Society for Crippled Children. These are now banded together in an Australian organization. The methods employed differ somewhat in each State, and through difficulties arising in war years I am able to speak with first-hand knowledge of my own State only; but, broadly speaking, the same remarks could be made about other States. With us, by means of the organization created to exploit the treatment by convalescent serum in 1930, we were able when the epidemic came in 1937 to avail ourselves of the generosity of the Nuffield bequest, and in addition to treating acutely ill patients in the Metropolitan Infectious Diseases Hospital, Northfield, to carry on the treatment of convalescents at the Adelaide Children's Hospital and then at a special home built at the seaside. The follow-up system in each State has led to the education of these children, which had previously been neglected, and vocational guidance has put them into occupations suitable to their disabilities and has turned many from liabilities on the State to assets for the State. This is a definite extension of the idea of prevention—prevention of disability arising as an effect of past infectious disease.

Further, the setting up of registers of cripples in each State has gradually led to a differentiation of children crippled as a result of accidents or tuberculosis infection, from the children crippled by flaccid paralysis coming on at varying ages, as the result of a poliomyelitis infection,

and from those crippled with spastic paralysis generally dating from birth and in many cases accompanied by mental defects. The study of these spastic children has led to differentiation into three classes, A, B and C. A class comprises those who are mildly afflicted and who, with treatment and education at ordinary or special schools, will in time become self-supporting and lead a normal life. B class includes those children who wear surgical appliances and learn to struggle on their feet. Frequently they suffer from spastic visual and speech defects. They can be trained in some measure to be partly or wholly self-supporting. Many of them cannot compete with the normal child in school or in play. Later on they would be unsuitable for the usual range of vocational training and employment. Such children are at present included with other cripples at hospitals and special schools. They need specialized care and training, with the emphasis on manual work. C class comprises pathetic, helpless spastics, of whom a certain percentage, through treatment, may be transformed into the B classification.

Concurrent with this concentration on the crippled child have been the increasing study and investigation of all aspects of child life. In the report of the National Commission of Health in 1927, attention was drawn to the lack of attention to the health of the pre-school child. Since then there has been a quickening of interest in child life and child nutrition throughout Australia. Preliminary attention had been given to certain aspects of this nutrition problem by the experimental investigations initiated by the National Health and Medical Research Council in 1937—first into the nutrition of children in poor homes in the capital cities of Australia, and then into that of the children of outback districts. These had shown that from 10% to 15% of these children were subnormal in weight. What is more interesting is that the same results were found in an intensive five-year study of the health of 4000 children from pre-school age to adolescence in a rural hills district in South Australia, where there were no large central town and no slums, a fixed population for two or three generations, and a plentiful food and water supply. The uniformity of these results with those in city and outback districts shows that the subnormal weight cannot be due to low calorie value in food supply (for food is abundant) or to vitamin *B* deficiency, for a collateral investigation by the Australian Institute of Anatomy has shown that in many cases the vitamin *B* content of our flour exceeds that of the fortified flour in England. Further detailed investigations into the home conditions in this rural district showed that the fault was not in the food, but in the feeding.

The interest aroused in these investigations—originally sponsored by the Commonwealth Government—has led to an effort in which Commonwealth and State are cooperating, by which 1000 of these children in a selected area are having special treatment for dental defects, posture defects and nutritional defects. Special attention is being given to the relation of the fluorine content of drinking water to dental caries—a subject which has aroused much interest in America of recent years.

Here we see a special instance of the combination of experiment and education. Similar stimulating results have been seen as the result of the work of the Lady Gowrie pre-school clinics, which were established in 1940 in each capital city and which combine attention to nutrition and health with careful records and with education of the parents in the proper measures for ensuring the healthy development of their children. The recent collation of results at the end of the first five-year experiment confirmed in a striking way results obtained in London a few years ago, that not merely the physical but the mental development of the child is retarded by unhappy home conditions, and that lack of parental cooperation is just as important as lack of food.

One side issue of this collation of results is to confirm statistically the painful impression created in the mind of any true lover of his country who observes the family groups in parks and gardens and realizes the comparatively small proportion with more than two children in a family. Yet when we make allowance for inescapable losses of life before middle age, two children per couple do not even replace the original pair. Our eyes have been blinded to the ultimate result of this situation in the nation by our legitimate pride in our falling death rate in infants and by our increasing efforts on behalf of young children. In this paradox we have an instance of the universal truth, that as any article becomes scarcer it becomes more precious.

The steadily maintained attack on our infantile death rate since the beginning of the century is a striking illustration of the value of experiments combined with education. The improvement was at first confined to infants between one and twelve months of age and was due to the sustained campaign for the education of mothers in the proper feeding of infants and in the prevention of gastro-intestinal infections. Then began the experiments of baby health centres in large cities, which spread to country towns, and finally, by means of baby trains, to scattered country districts. More intensive investigation led over twenty-five years ago to the differentiation of neonatal deaths due to pre-natal or natal causes, from post-natal deaths due to post-natal infections or errors in feeding. The latter occur chiefly after the first month, the former in the first month of life and generally in the first week. To meet this problem pre-natal clinics were established in various centres, and the effect of these in reducing neonatal mortality has begun to be felt only in the last few years. Further study and investigations emphasized that a certain proportion of these infants were deeply jaundiced from birth, and experimental work in regard to this class of case has opened up an entirely new field in preventive medicine. Since the first world war blood transfusion had become more and more a recognized procedure in lessening mortality from acute hæmorrhage in accidents and operations. Safety measures for this procedure included the discovery of the four main different blood groups, and further investigation revealed that in addition to ascertaining the blood group to which the patient and donor belonged, it was necessary also to learn whether the blood of either or both possessed the Rh factor—so called because of its existence in the rhesus monkey. Experiments showed that at least 15% of patients have Rh-negative blood and that the mixing of Rh-negative blood with Rh-positive blood in certain cases led to severe febrile reaction and hæmolysis, often followed by jaundice, so that it became the practice to give only Rh-positive blood to Rh-positive patients and Rh-negative blood to Rh-negative patients. The extension of these investigations to pregnant women has shown that if the mother's blood is Rh-negative and the father's is Rh-positive, no harm may result in the first pregnancy, but in a certain proportion of cases the mother became sensitized by the fœtal blood of a different type circulating through the placenta, so that with a subsequent pregnancy hæmolysis and destruction of blood cells will occur. This was found to be the cause of severe and fatal jaundice occurring in very young infants. Consequently the procedure is now being emphasized that early in every pregnancy, the prospective mother and father should have their blood examined for this factor and preventive measures should be taken accordingly. With the modern enthusiasm for surgery, some enthusiasts advocate that in all cases in which serological findings suggest the possibility of this complication Cæsarean section should be performed, just as many would advocate termination of pregnancy in a mother who has suffered from rubella. But we need a great deal more investigation and education before laying down hard and fast rules of procedure, and meanwhile it is being recommended that the blood of both prospective parents should be examined for the Rh factor early in the first pregnancy and appropriate preventive measures taken.

Along with this has gone the study of the effect of infections in pregnancy. We have known for years that when a pregnant woman contracts smallpox the fœtus dies *in utero*. The same thing is true in typhoid fever and other severe infections. The effect of maternal syphilis has also been known for centuries—the death of the fœtus *in utero* in early pregnancies, premature labour, and an

infant born with congenital syphilis in later pregnancies. In the 1918-1919 pandemic of influenza it was recognized that practically all mothers who contracted influenza after the sixth month of pregnancy died and their babies died with them. But since 1940 we have become cognizant of a new phenomenon. Up to that year we had looked upon rubella or German measles as a mild infection, rarely accompanied by sequelæ or complications. But in that year Gregg, of Sydney, observed and published the results of his investigations in a number of babies whose mothers had contracted German measles in the second or third month of pregnancy and who were born with congenital cataract due to defective lens, or with congenital deafness or congenital heart disease. Investigation in each State since then has confirmed and extended these observations to include delayed and defective dentition and other troubles, such as poor physical and mental development. In babies who came to necropsy there were found to be certain defects in parts of the brain whose maximal growth in the fœtus corresponds with that of the lens and occurs in the second or third month of pregnancy.

In both Adelaide and Sydney special committees were set up to investigate this whole problem, and their published reports support all that Gregg claimed in his original paper. Since then similar cases have been described in the American literature. These discoveries have raised several important questions in preventive medicine, the full import of which is not yet realized. For one thing, in my own State, where over 100 such children have been identified, a special school has been established to train these children, since their care and training come properly under neither the kindergarten nor pre-school clinics nor the Crippled Children's Association activities. In addition these observations have raised certain important questions which are now being extensively discussed:

1. Has this phenomenon occurred before and been overlooked? As one who has been actively interested in questions affecting rubella, which was just being recognized when I began practice some fifty years ago, I confess to considerable difficulty in agreeing that this was so. A very high authority has suggested that it came under notice in 1940 because of an unusually large number of non-immune young adults being present in the community through the absence of any such epidemic for several years previously.

2. Was there a superadded factor or a slightly different strain of virus in this epidemic, such as we know has occurred from time to time in allied infections? In this connexion it is interesting that the similar occurrence noted in American literature apparently took place a year or more later than ours.

3. Is this phenomenon likely to recur in future epidemics? Dr. A. L. Tostevin, who is chairman of the South Australian committee which has been investigating this subject is so strongly impressed with the disastrous results in this series of cases that he supports the suggestion that termination of pregnancy should be recommended in any patient who contracts a rubella infection in the first two or three months of pregnancy. The fact that such a suggestion should be seriously made shows how seriously the position is regarded by those who have most closely studied it. Certain it is that instead of our regarding these epidemics lightly, as in the past, very special attempts should be made to safeguard prospective mothers from exposure to this infection, and at present the best suggestion is that made by Dr. F. M. Burnet in a personal communication, for the immunization of all adolescent girls against rubella by the use of convalescent serum or γ globulin or some such method. He also suggests an intelligence service to ascertain the extent of rubella in the community. How best this can be accomplished can be ascertained only by further experiments, and up to the present when this has been suggested authorities have not been favourable.

A second question arises as to the extent to which other congenital defects may be due to the effects of unsuspected infection during pregnancy. Investigations into the problem of mongolism have been recently published, which raise the question whether this can be due to infection in the second or third month of pregnancy. It has been even suggested that in these cases an unrecognized influenza infection may play a part. All these demand further investigation and experiment. They are linked up with the question of those spastic defects to which reference has earlier been made. In my student days these cases were put down to hæmorrhage on the surface of the brain, later to lack of development of certain parts of the pyramidal tract. Recently the question has been raised as to how far these cranial defects may be due to some infection of the mother early in her pregnancy, and this calls for extensive experiment. Both in Adelaide and in Melbourne, and possibly in other centres, such research is already being mooted, and I believe there is here a great opportunity for some of our younger generation.

Recent advances in this particular field may be summed up as follows. The first quarter of this century saw the introduction of measures for the reduction of post-natal mortality and disease. The second quarter witnessed the spread of education for the prevention of neonatal and natal disease, and the phase on which we are now entering demands experiment and investigation as regards intra-uterine fatalities and disease. And this reemphasizes that continuous change in emphasis, which was mentioned earlier in this address, and which must necessarily continue if preventive medicine is to remain a living and growing factor in our national life.

At present we are going through a period of disillusion. The "Brave New World" about which we heard so much during the early days of the war is very slow in making its appearance, and when signs of it do appear we are not always pleased with them. To remedy such a state of mind we need to look back in history. The victory of Waterloo in 1815 marked the end of a world-shaking conflict less extensive than our recent war, but longer in duration and fought with the same purpose of preventing one man or one system from dominating the rest of the world. It ushered in a new era and a hundred years of peaceful expansion; yet the years immediately following it were marked by unrest and upheavals throughout the whole of the then known civilized world.

This disjointed and imperfect narrative of what has quietly been going on beneath the surface in recent years of strife and unrest may nerve us to fresh endeavours to face and solve the new problems which these experiments have opened up before us. As the light of increasing knowledge spreads, it illumines wider tracts of human life than were known before, and brings into sharp relief hills of difficulty that were previously shrouded in the mists of ignorance. In so far as we too run with patience the race that is set before our generation, we too shall find that the path of duty is the way to glory, and that

> . . . the toppling crags of duty scaled
> Are close upon the shining tablelands
> To which our God himself is moon and sun.

PROTEIN DEFICIENCY AND THE USE OF HUMAN SERUM IN ITS TREATMENT.[1,2]

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Deficiency of protein in the human body is an aspect of medicine that has received much attention in the last ten years. This is due to two main factors: the volume of research being carried out on protein metabolism and its applications has been very large, and starvation under conditions of war has focused the attention of the medical world upon the problem. The practical aspects of

[1] This work was carried out in the Department of Medicine, University of Sydney, and in the Medical Department of the Royal Prince Alfred Hospital.
[2] Read at a meeting of the Royal Australasian College of Physicians, Sydney, October, 1947.

protein deficiency may be summarized as follows: (i) an appreciation of the conditions under which protein deficiency occurs or is aggravated; (ii) the means of recognizing and assessing protein deficiency; (iii) the effects of protein deficiency; (iv) the methods available for the treatment of protein deficiency. The first three of these will be mentioned briefly and the last will be discussed in more detail, and in particular the use of human serum given intravenously as a form of treatment, which forms the basis of the work to be described in this paper.

Causes of Protein Deficiency.

The causes of protein deficiency may be set out under three major headings which are self-explanatory: pre-hepatic, hepatic and post-hepatic.

Pre-Hepatic Causes.

The first cause may be deficient intake of food. This may be an absolute deficiency of protein in the diet, or it may be relative deficiency in physiological conditions such as pregnancy and lactation. There may also be difficulty in ingestion of food due to œsophageal or pyloric obstruction.

The second cause may be defective digestion and absorption. This occurs in conditions such as pancreatic disease, steatorrhœa, persistent diarrhœa and intestinal fistulæ.

Hepatic Causes.

Under the heading of hepatic causes are conditions in which the synthesis of proteins from the absorbed amino acids is defective—acute forms of hepatitis, cirrhosis of the liver, multiple secondary neoplasms in the liver and toxic hepatitis.

Post-Hepatic Causes.

The first of the post-hepatic causes is trauma. Even after simple fractures of small bones there is increased protein catabolism, the cause of which is unknown. It is usually referred to as the "toxic destruction of protein" and is maximal four to eight days after injury. The loss is particularly pronounced after burns.

A similar "toxic destruction of protein" takes place in acute febrile diseases and is most pronounced in patients with adequate nutrition. It does not occur in chronic febrile conditions, in which cases a protein deficiency is usually due to a low intake caused by anorexia.

Hæmorrhage is a further cause of protein deficiency.

Serous exudates may be external, as in burns, extensive weeping dermatitis, purulent discharges, infective diarrhœa and ulcerative colitis, or internal, as in ascites.

Albuminuria may be present.

Hyperthyreoidism and *diabetes mellitus* may be involved. In these diseases there is no increase in the protein requirement, but protein is often called upon for the supply of Calories.

Recognition and Assessment of Protein Deficiency.

A complete examination of the history, with particular reference to the dietary intake, may make one suspect an otherwise unrecognized protein deficiency.

Loss of weight in chronic conditions as distinct from acute is an important sign and may be the only evidence of protein deficiency.

In conditions of acute protein deficiency there is usually no change in the plasma protein level. A considerable protein deficiency has to be present before there is a fall in the total proteins below the normal minimum level of 6·0 grammes *per centum* or in the albumin fraction below 4·0 grammes *per centum*. Such a fall is more common in protein deficiency of longer standing, but is not always present, as will be seen in the quoted cases. In any case, it is not sufficient to estimate the total protein content only, as only the albumin fraction tends to fall, and the globulin fraction may even rise, so that the total protein level may be kept within the normal range.

It has been demonstrated many times that in protein deficiency there is a diminution in the circulating plasma volume. Waters, Rossiter and Lehmann[40] have shown that in deficiency due to starvation the weight loss is a more sensitive indicator of deficiency than plasma volume. However, by using the plasma volume to calculate the total circulating plasma proteins, or better, the circulating albumin, it may be possible to employ a formula as suggested by Elman *et alii*[5] to assess the total body deficiency of protein. This is based on the finding in dogs receiving a protein-poor diet that the decline in total circulating plasma albumin was a small but relatively constant part of the total nitrogen lost—3% to 4%. So far there is no proof that this is so in humans or in protein depletion from other causes; however, it serves to show why a considerable deficiency of protein is required to produce a significant change in the serum albumin level. Unfortunately, the normal range for the total circulating albumin has such a large variation that it may not be of much use for the estimation of the degree of protein deficiency (R. H. Lyons[22]).

In conditions in which acute protein deficiency occurs, as in shock and collapse, estimation of the plasma volume affords a fairly reliable indicator of the circulating deficiency.

Effects of Protein Deficiency.

The following are the effects of protein deficiency: (*a*) Loss of weight and fatigue. (*b*) Anorexia—this may lead to a vicious circle. (*c*) Ileus and œdema of the bowel wall, leading in turn to impaired absorption. (*d*) Tissue œdema. There is no definite critical low level of the plasma proteins for the production of œdema, which also depends upon salt and water balance and upon the state of the capillaries. (*e*) Diminished production of antibodies and a lowered resistance to infection (Cannon,[3] Krebs[20]). (*f*) Delayed wound healing. (*g*) Increased susceptibility of the liver to drugs and poisons.

Treatment of Protein Deficiency.

The following methods are used in the treatment of protein deficiency.

Whole Protein by Mouth.

The oral administration of whole protein by mouth is the easiest and physiologically the most desirable method of treatment. When a high protein intake is indicated and able to be achieved, a really high level of protein and caloric intake should be aimed at—at least 150 to 200 grammes of protein of high biological value and a total of 3000 Calories. There is a tendency to think that 100 grammes per day constitute a high protein intake. One particular protein food deserves special mention because it is the only food item that can be given conveniently in really large amounts to provide the protein required without the disadvantage of excessive fat. This is powdered skimmed milk. Every 100 grammes of this powder contain 37 grammes of protein, 50 grammes of carbohydrate and only one gramme of fat. It can be conveniently made up with twice its weight of water and flavoured with "Aktavite". This mixture is fairly palatable and can be drunk by mouth or given by tube, and each pint contains 92 grammes of protein and 900 Calories. Most patients, even those with pyloric obstruction, can take three or four pints of this mixture a day without any other food.

Amino Acids by Mouth (Casein Hydrolysate).

Casein hydrolysate is very unpalatable and is probably not better absorbed than whole protein, except by patients suffering from pancreatic disease and ulcerative colitis. There is no indication for its use for patients with hypoproteinæmia and a relatively normal alimentary tract, though one often sees it used in such cases.

Amino Acids Intravenously.

The amino acid preparations used intravenously are usually hydrolysates of casein, hydrolysed either by pancreatic enzymes or by sulphuric acid; the latter destroys tryptophane, one of the essential amino acids, which in a synthetic form has to be added subsequently. This means of treating human patients was pioneered by Elman[4] in 1939. He found that he could maintain nitrogen balance and cause serum protein to be regenerated. A great advance was thus made over the usual routine of the intra-

venous administration of saline solution and glucose, especially post-operatively. It was known from animal experiments that a similar object could be achieved by the use of homologous serum (Whipple *et alii*[35][36]). However, this was not a very practical method at that time. Elman's method of treatment has been used extensively since his pioneering work, especially in the United States of America, and the present position was reviewed by Elman himself in 1945.[8] The main difficulty with this form of intravenous alimentation is the frequency of venous thrombosis and of reactions if administration is too rapid. As the preparations are given in about a 3% solution in a 5% glucose solution, over three litres have to be given to supply the equivalent of 100 grammes of protein, and this extending over at least six hours. At present in Australia this is an expensive form of treatment if carried out in adequate amounts for an adequate time; it is not really indicated in small amounts for three or four days only. Despite these disadvantages, it can nevertheless maintain a person in nitrogen equilibrium over a long period of time, and it is not followed by a rise in nitrogen excretion after cessation of treatment (Elman *et alii*[6]). Another method of intravenous alimentation with amino acids is by the use of a solution containing synthetic amino acids. The amino acids used are the so-called ten essential amino acids (Rose[31]), given in physiological proportions. In this way amino acids can be given in up to 10% solution, and fairly rapidly without ill effect (Madden and Whipple[20]). Emerson and Binkley[9] have shown that small amounts of such amino acid mixtures given intravenously can greatly increase the utilization of dietary protein.

Plasma or Serum Given Intravenously.

As has previously been mentioned, Whipple *et alii* in 1934[35] and 1938[36] showed that homologous plasma given intravenously to dogs was well utilized and maintained nitrogenous equilibrium. It caused no increase in the excretion of nitrogen, suggesting that it was assimilated without breakdown to its constituent amino acids. Whipple used this evidence to support his concept of the dynamic equilibrium of body proteins, whereby there is a ready interchange between tissue and plasma protein. He further found that there was no loss of surplus nitrogen after the infusions given to protein fasting dogs. However, sometimes there was a large loss of nitrogen, and it appeared to be associated with toxic reactions subsequent upon the administration of the plasma, or to excessive quantities of plasma having been given in the absence of adequate fat and carbohydrate.

In 1943, Elman and Davey[7] described the use of large plasma transfusions (three grammes per kilogram per dog) in the treatment of protein deficiency in dogs. The plasma volume increased, the plasma protein level exceeded the normal, and there was a large diuresis. There was no increase in urinary excretion of nitrogen during the week of the plasma injections, but in the following two weeks there was an increased nitrogen output, suggesting that the nitrogen supplied in these large transfusions was not permanently utilized. However, this may have been due to the relatively large transfusions given.

With regard to the giving of human plasma intravenously to humans, Opitz and Klinke[30] in 1924 gave it to six infants and children. The results are difficult to evaluate because of reactions. In two cases there was an increase in urea excretion and in one case there was no such increase. Kremen *et alii*[21] in 1942 described how a patient given daily intravenous transfusions of plasma was maintained in positive nitrogen balance; the treatment was accompanied and followed by an actual fall in the urinary output of nitrogen. Early in 1947 F. L. Meyer *et alii*[24] reported the use of plasma transfusions for five days as the sole source of nitrogen in three normal subjects who received casein hydrolysates by mouth before and after the period of transfusion. Again a positive nitrogen balance and actual decrease in urinary nitrogen output occurred during the transfusions; but subsequently a large part of the nitrogen was lost. This may have been related to the level of protein intake following the transfusion. Plasma transfusion was also used with success in the treatment of starvation at the Belsen prison camp (Vaughan[33]).

Peters[28] states that plasma does not appear to be an efficient source of protein for general nutritive purposes, owing perhaps to the fact that its protein escapes the normal metabolic processes through which most amino acids and proteins pass.

Two other preparations of a similar type have been used in the treatment of protein deficiency—a 25% solution of human serum albumin (Janeway *et alii*[18]), and "colloidal infusion", an albumin product obtained from casein in cow's milk, in 4% solution (Fedorov[10]).

Present Investigations.

Apart from surgical shock, it appears that plasma or serum given intravenously may be a useful therapeutic agent in many other conditions. (i) It would obviously be a useful form of treatment in conditions of non-traumatic shock, such as diabetic coma, severe gastro-intestinal infection with dehydration, acute necrosis of the liver, and severe overwhelming toxæmias. (ii) Plasma given intravenously may be of use as a diuretic agent in cases of anuria, especially if double-strength reconstituted dried serum is used. The main disadvantage as a diuretic agent in these cases is its relatively high salt content. (iii) Plasma appears to have many advantages as an agent for supplying protein for nutritional purposes when this cannot be supplied at all or can be supplied only in insufficient amounts by mouth. Of course, this is where the amino acid preparations for intravenous administration have their usefulness. However, certain drawbacks of the latter line of treatment have already been indicated, and it was thought possible that the use of serum would overcome some of these. As serum can be given without increase in the nitrogen output, we may consider it as having a virtual "biological value" of 100%. On the other hand, the casein hydrolysates have the same biological value as casein itself, which is about 25%. Therefore, we may be tempted to say that from a nutritional point of view it is necessary to give intravenously only one-quarter of the amount of protein as of serum compared with that given as a hydrolysate. Also, serum has a protein content of 6% compared with the equivalent concentration of only 3% in hydrolysates. Both these factors mean that a much lower volume of fluid will suffice to achieve the same purpose. One would also anticipate fewer reactions and venous thromboses from the use of serum. Against these apparently great advantages is the obvious disadvantage of the difficulties of supply of human serum. During the late war there appeared to be a fairly abundant supply of serum, and it was under these conditions that treatment was carried out in the first two cases to be described. In the third case treatment was given with the civilian hospital supply of serum, and consequently the treatment was really inadequate quantitatively. The last three patients were treated with serum made available for this investigation by the Australian Red Cross Society.

The six cases to be described illustrate types of cases already mentioned and also some of the points mentioned. The last three cases were also investigated with the object of attempting to find how assimilated protein in the human subject is distributed between the plasma and the tissues. It was impossible to carry out these investigations under well-controlled conditions for various reasons; they lack many of the precise controls that one can place upon laboratory animals or an adequate number of patients assembled for such investigations by a team of workers. However, it is thought that some information of value emerges from them.

Methods.

Anticoagulant.—For the estimation of the hæmoglobin and hæmatocrit values, a mixture of two parts of potassium oxalate with three parts of ammonium oxalate was used as anticoagulant (Heller and Paul[14]). This has the advantage that it causes no appreciable change in the cell volume. The oxalate mixture was used in a concentration of one milligramme per millilitre of blood.

Hæmoglobin Value.—For estimation of the hæmoglobin value 0·02 millilitre of oxalated blood was diluted with 8·0 millilitres of N/10 hydrochloric acid. After one hour the estimation was made in a Klett biocolorimeter of visual type, a Newcomer[35] glass colour standard being used.

Hæmatocrit Value.—For the determination of the hæmatocrit value, two Wintrobe[37] tubes were filled with oxalated blood and centrifuged at 3000 revolutions per minute for one hour. The readings were averaged and in all cases they were in close agreement.

Serum Protein Nitrogen.—For the estimation of the serum protein nitrogen level a protein-free filtrate was prepared by the Folin and Wu[11] technique as modified by Haden.[13a] Half the standard quantity of precipitating reagent was used. The nitrogen was then estimated by the Koch-McMeekin[19] direct nesslerization method.

Serum Protein and Albumin.—For the serum protein and albumin estimations a Koch-McMeekin[19] method of direct nesslerization after digestion was used. The globulin was precipitated with 21% sodium sulphite solution at room temperature for ten minutes (Campbell and Hanna[1]) at a dilution of 1 in 31. This was used in preference to the standard precipitation with 22·4% sodium sulphate solution at 37° C. for three hours (Howe[15]), as it is simple and has also been found to give comparable results at a dilution of 1 in 31 (Isbister[16]).

TABLE I.
Case I.

Date.	Blood Urea. (Milligrammes *per Centum.*)	Serum Chloride (*Sodium* Chloride, Milligrammes *per Centum.*)	Carbon Dioxide Combining Power. (Volumes *per Centum.*)	Hæmatocrit Value. (Volumes *per Centum.*)	Plasma Proteins. (Grammes *per Centum.*)
6/5/44	80	600	—	46	7·4
7/5/44	110	680	—	41	6·4
8/5/44	175	600	26	46	6·4
9/5/44	190	600	27	44	7·4
10/5/44	220	610	21	47	7·7
11/5/44	250	610	24	47	7·7
12/5/44	290	610	22	42	7·2
13/5/44	392	610	—	38	8·3
14/5/44	380	550	25	42	8·3

Nitrogen Content of Food.—For the nitrogen content of food the Australian food tables (Osmond[27]) were used.

Nitrogen Content of Serum, Urine and Fæces.—The nitrogen content of serum, urine and fæces was estimated by the macro-Kjeldahl technique, with the use of hydrogen peroxide in the digestion (Koch and McMeekin[19]).

Plasma Volume.—Plasma volume was determined by the injection of a measured volume of the dye "T-1824" (Evans blue) in 0·5% solution and the taking of a series of three-millilitre samples of blood from 10·0 minutes up to 52·5 minutes, there being eight samples in all. After clotting and double centrifugation the difference in the optical density of the serum of the dyed samples compared with an undyed sample taken before the injection of the dye was determined in a "Spekker Photoelectric Absorptiometer" (Adam Hilger, Limited). This apparatus was fitted with micro cells and holders, allowing measurements to be made on 0·5 millilitre of serum. A Wratten 29F light filter with a heat filter was used, giving a maximum transmission of 48% at a wave-length of 640μ. This filter combination does not transmit at a wave-length of less than 600μ and therefore is not affected by any light absorbed by a slightly hæmolysed sample. The dye used was supplied by Imperial Chemical Industries and had maximal light absorption at a wave-length of 620μ. Optical density was converted to the concentration of the dye by means of a calibration curve, which was adjusted by two central dilutions of the subject's undyed serum with "T-1824". Then by extrapolation on a semilog plot (Gregerson and Rawson[13]) the concentration of the dye at zero time was obtained and from this the plasma volume was calculated. The method is a modification of that used by Davis,[3] worked out by Isbister and Steinbeck.[17]

Blood Volume.—Blood volume was determined by the following formula, modified from Shohl and Hunter[23] and from Root, Roughton and Gregerson:[20]

$$\text{Blood volume} = \frac{\text{Plasma volume} \times 100}{100 - \frac{(\text{Hæmatocrit value})}{1{\cdot}04}}$$

Comment.—The first two cases described were investigated in the pathological laboratories of service hospitals. The methods used were undoubtedly the methods used in routine work; but it is known that the hæmatocrit values and plasma protein levels were calculated from the specific gravities of whole blood and plasma (Phillips, Van Slyke *et alii*[20]).

Reports of Cases.

CASE I.—D.J.W., a female patient, aged twenty-two years, was admitted to Number 3 Royal Australian Air Force Hospital, Concord, New South Wales, on May 4, 1944, having taken 120 grains of ammoniated mercury powder with suicidal intent. Within a few hours she began to vomit,

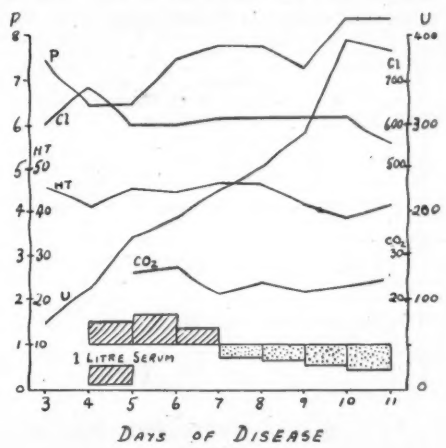

FIGURE I.

Patient D.J.W. P = plasma protein (grammes per centum); Ht = hæmatocrit value (volumes per centum); Cl = serum chloride content as sodium chloride (milligrammes per centum); U = blood urea level (milligrammes per centum); CO_2 = carbon dioxide combining power of the blood (volumes per centum); serum given intravenously, cross-hatched area, scale indicated; urine volume, stippled area (not quantitative).

frequently passed blood-stained fæces, and passed practically no urine. What urine was passed—about one fluid ounce—was deeply stained with blood and contained much albumin. She rapidly became dehydrated, and this was combated with the administration of glucose-saline solution intravenously, and later with fluids given by mouth and *per rectum*. Hot packs were applied to the loins. On the second day the patient was still suffering from anuria, so 200 millilitres of 20% glucose solution were given intravenously. Later, a second lot of glucose-saline solution was given intravenously. On the fourth day she was given one and one-third litres of human serum intravenously, and on the following day one and two-third litres of serum, as well as saline solution subcutaneously. She was still passing blood-stained fæces frequently, and she still had anuria. On May 10 she was given one litre of serum, and the following day she passed five fluid ounces of urine. From then on she passed more urine, though the exact amounts could not be saved and measured. However, she still continued to have vomiting and diarrhœa with the passage of blood; nevertheless a positive fluid balance could

be maintained. She passed more urine until May 15, when her general condition deteriorated in the face of a steadily increasing nitrogen retention and further dehydration. Another litre of serum was given. She died suddenly, early on May 16, the twelfth day after her admission to hospital.

Autopsy revealed almost complete destruction of the mucosa of the lower part of the ileum and the colon, and severe necrotic changes in the liver and kidneys. Changes in the blood urea level, the serum chloride content, the hæmatocrit value, the plasma protein level and the carbon dioxide combining power are shown in Table I and Figure I.

Comment.

As this patient rapidly developed anuria, it was considered desirable to use what was thought to be the most efficient methods of reestablishing urinary secretion. Obviously she became rapidly dehydrated, owing to the vomiting and diarrhœa. The fluid lost was replaced by the intravenous administration of saline solution and glucose. As this was not followed by any urine secretion after three days, and as it appeared that the blood volume had decreased, it was decided to give serum intravenously with the object of increasing the circulating blood volume and by this means the renal blood flow. After four litres of serum had been given over a period of three days, urine secretion commenced. It was impossible to measure the urine output on account of its being passed at the same time as the frequent fluid fæces. However, the patient was sure that the urine output was increasing. Despite this and a reasonable fluid intake by mouth of milk and orange juice, she became dehydrated again on the eleventh day and was given further saline solution subcutaneously

TABLE II.
Case II.

Date.	Time.	Blood Pressure. (Millimetres of Mercury.)		Hæmatocrit Value. (Volumes *per Centum.*)	Plasma Protein. (Grammes *per Centum.*)
		Maximun.	Minimum.		
14/5/45	8.0 p.m.	70	40	52	6·15
	10.0 p.m.	50	30	—	—
	11.0 p.m.	70	40	—	—
15/5/45	7.0 a.m.	90	50	39	5·8
	11.0 a.m.	110	60	—	—
16/5/45	10.0 a.m.	120	80	41	6·7

and serum intravenously. She died suddenly on the twelfth day. Microscopic examination of the liver and kidneys revealed gross necrosis, quite sufficient to account for her death. It was surprising that she had secreted any urine at all. One considers that the reestablishment of urinary secretion was at least aided by the intravenous administration of serum.

CASE II.—R.A.I., a male patient, aged nineteen years, was admitted to Number 2 Medical Receiving Station in New Guinea on May 14, 1945, with a clinical diagnosis of acute bacillary dysentery. On his admission to hospital his symptoms had been present for twelve hours. His temperature was 102·8° F., his pulse rate was 124 per minute, and his general condition was fairly good. Treatment was started with the administration of fluids by mouth and of sulphaguanidine. Four hours after his admission to hospital his temperature was 104° F., his pulse rate was 140 per minute, and his blood pressure was 70 millimetres of mercury (maximum) and 40 millimetres (minimum). The patient stated he felt better, but he was lethargic and dehydrated. He had had six bowel motions in the four hours and had vomited once, but had not lost much fluid by either of these routes. The intravenous administration of human serum was then commenced. The first litre was given in two hours, the following one and a half litres in eight hours, and a final half-litre in four hours—a total of three litres of serum in fourteen hours. His condition was much improved after this treatment, and he was able to take nourishing fluids by mouth. The blood pressure rose to 110 millimetres of mercury (maximum) and 60 millimetres (minimum), and during this time he passed 33 fluid ounces of urine. The blood pressure, hæmatocrit values and plasma protein levels are shown in Table II and Figure II. The diagnosis of bacillary dysentery was confirmed bacteriologically. He recovered and was discharged fit for duty on June 13, 1945.

Comment.

This patient sank rapidly into a serious condition of circulatory collapse and dehydration, and it is considered that the intravenous use of serum was life saving. The effective restoration of the circulating blood volume is evidenced by the rapid return of the raised hæmatocrit value and the blood pressure to normal. The fact that the plasma protein level did not alter much with the large volume of serum given illustrates the way in which some of the protein introduced was used in the protein metabolism of the body and in assisting to replace protein that

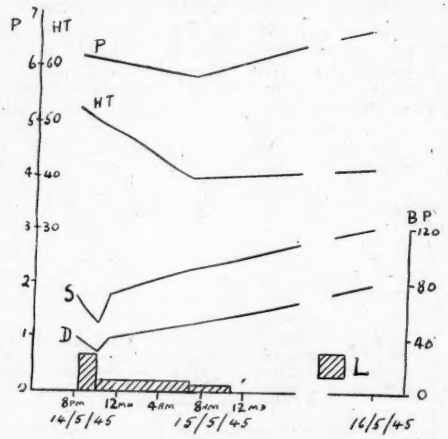

Figure II.

Patient R.A.I. P = plasma protein (grammes *per centum*); Ht = hæmatocrit value (volumes *per centum*); S = systolic blood pressure and D = diastolic blood pressure (millimetres of mercury); Cross-hatched area, serum given intravenously; area L represents one litre.

had been lost. The intravenous use of saline solution in this case would have remedied the tissue dehydration, but would not have restored the blood volume, and the patient would probably have perished.

CASE III.—I.L.Z., a female patient, aged forty-five years, was admitted to the Royal Prince Alfred Hospital, Sydney, on June 4, 1946, suffering from ulcerative colitis, of which she had had relapses over the past twenty years. For three weeks prior to her admission to hospital she had had twenty bowel actions per day, passing blood and mucopus with each specimen; and this was associated with severe colic and tenesmus. During the preceding sixteen months she had lost 65 pounds in weight. She was given medical treatment in hospital—fluids only by mouth (including egg flips and orange juice), polyvalent and anti-dysenteric serum, bowel lavage and liver extract, and, on June 7, she received one litre of blood by transfusion. She averaged ten to fifteen bowel actions per day, and by June 18 her condition had deteriorated by virtue of toxæmia and dehydration to such an extent that she was given glucose and saline solution intravenously. On June 19 her state of dehydration was worse, despite the intravenous therapy, and it was realized that she was also suffering from a severe protein deficiency. Her intake by mouth of milk and eggs was increased with difficulty, and human serum was then given intravenously, 4500 millilitres in all over two days. Her general condition improved remarkably, and then fluids and protein by mouth were forced again, but still with difficulty. The changes in hæmatocrit values and serum protein levels, as well as the results of a nitrogen balance study, are illustrated in Table III and Figure III. Subsequently her condition improved only slowly, mainly owing to the difficulty of having sufficient protein absorbed by the alimentary tract. She remained hypoproteinæmic, and was discharged from hospital, relieved only, about six weeks later.

TABLE III.
Case III.

Date.	Hæmatocrit Value. (Volumes *per Centum.*)	Serum Protein. (Grammes *per Centum.*)	Serum Albumin. (Grammes *per Centum.*)	Nitrogen Intake. (Grammes.)		Average Daily Output of Nitrogen. (Grammes.)	Daily Average Nitrogen Balance. (Grammes.)
				Food.	Serum.		
19/6/46	45·0	5·83	3·40	6·0	8·8	4·1	+21·9
20/6/46	—	—	—	11·0	26·2	4·1	+21·9
Total..	—	—	—	17·0	35·0	8·2	+43·8
21/6/46	24·25	5·61	3·77	11·0	9·0	8·0	+6·0
22/6/46	—	—	—	11·0	—	8·0	+6·0
23/6/46	—	—	—	11·0	—	8·0	+6·0
Total..	—	—	—	33·0	9·0	24·0	+18·0
24/6/46	34·25	5·72	3·61	—	—	—	—
1/7/47	25·5	5·55	3·07	—	—	—	—

Comment.

This patient was almost moribund when the intravenous serum therapy was commenced. The saline solution given intravenously had failed to raise the blood volume because of its rapid passage into the tissues, a process that was aggravated by the hypoalbuminæmia. Severe protein deficiency was also an aggravating factor, and the patient had also certainly been in a negative nitrogen balance up to this stage. A study of the investigations shows the rapid increase in blood volume as evidenced by the fall in the hæmatocrit value, and also the large positive nitrogen balance achieved by the intravenous serum therapy. The serum albumin level was little altered, owing to the rapid assimilation of the protein by the tissues. In this case further intravenous alimentation was indicated, but no more human serum and no form of casein hydrolysate were available.

CASE IV.—M.P., a female patient, aged twenty-eight years, was admitted to the Marrickville District Hospital in June, 1947, with a history of epigastric pain related to meals and of intermittent vomiting for six years. During this time she had had four hæmatemeses. She had lost one stone in weight early in the period of six years and had not been able to regain it, as food in adequate quantities caused her to vomit. An attempt was made to build up her weight and general condition by the usual medical treatment to fit her for surgical treatment. After two and a half months she had gained no weight, owing largely to an inadequate protein and caloric intake. Analysis of the gastric contents revealed achlorhydria, and radiographic examination of her stomach after a barium meal revealed "scarring and an early hour-glass deformity, with an ulcer that was probably still active".

It was thereupon decided to prepare this patient for operation as rapidly as possible by the intravenous use of serum. This was commenced on August 25, 1947, and in all six and a half litres of serum were given over a period of four days, together with a diet of milk, eggs and orange juice. During this time there was a gain in weight of five pounds, and the patient had retained a considerable quantity of protein nitrogen. The results of the investigations carried out are shown in Tables IV and V and in Figure IV. On September 9 operation was performed, and a pronounced hour-glass deformity was found high up in the stomach. This was incised longitudinally and sewn transversely, with the production of some enlargement of the opening, which previously had admitted only the tip of a finger. Convalescence was entirely uneventful, and the patient was sitting out of bed on the fourth post-operative day.

Comment.

Without intravenous alimentation it is doubtful whether this patient could have been subjected to operation without undue risk. The main trouble experienced in the actual administration was ready thrombosis of the veins. No reactions were experienced, although a headache was produced when about two litres of serum were given in eight hours. Examination of the tabulated results will show that a large positive nitrogen balance was achieved with the serum in comparison with that produced by the maximum dietary intake. It will also be noted that the urinary output of nitrogen actually fell during and immediately after the infusion of serum. The nitrogen retained as circulating protein amounted to 12·9 grammes. This represented 16% of the total amount of nitrogen retained during the experimental period (81·4 grammes). Also the nitrogen supplied in the serum represented about 50% of the total nitrogen given during the experimental period.

CASE V.—F.H.P., a male patient, aged fifty-six years, was admitted to the Marrickville District Hospital on August 14, 1947, with a diagnosis of duodenal ulcer and stenosis. The first manifestation of the presence of an ulcer occurred in 1941, when he suffered from a ruptured duodenal ulcer. Since then he had had typical ulcer symptoms off and on,

TABLE IV.
Case IV.

Date.	Corrected[1] Hæmatocrit Value. (Volumes *per Centum.*)	Serum Protein. (Grammes *per Centum.*)	Serum Albumin. (Grammes *per Centum.*)	Plasma Volume. (Litres.)	Blood Volume. (Litres.)	Circulating Serum Protein Nitrogen. (Grammes.)	Weight. (Pounds.)
25/8/47	39·8	6·68	4·75	2·59	4·30	27·7	103
26/8/47	36·1	—	—	—	—	—	—
28/8/47	34·6	—	—	—	—	—	110
2/9/47	32·8	7·80	5·48	3·25	4·84	40·6	108
9/9/47	33·7	7·80	5·22	—	—	—	109

[1] Corrected hæmatocrit = $\frac{\text{Observed hæmatocrit}}{1·04}$ (see formula for calculation of the blood volume).

relieved by medical treatment, which had been irregular. During the last nine months he had vomited frequently, especially at night, the vomitus containing undigested food and being rather copious. During the same nine months his weight had fallen from 126 to 110 pounds. Nine years

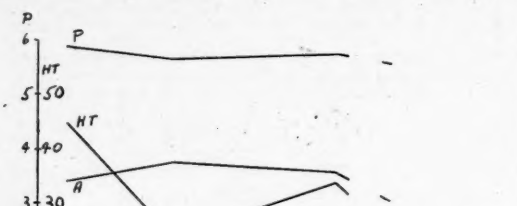

Figure III.

Patient I.L.Z. Ht = hæmatocrit value (volumes *per centum*); N = nitrogen balance (grammes of nitrogen per day); plain area = food given by mouth; cross-hatched area = serum given intravenously; stippled area = urine and fæces; P = serum protein and A = serum albumin (grammes *per centum*).

earlier rheumatoid arthritis had commenced, but had been inactive for the last six years. This had left him with some typical deformities and had probably contributed towards his general asthenia. Radiological examination of his stomach and duodenum revealed an ulcer towards the base of the duodenal bulb, which also showed considerable deformity, and pylorospasm; five hours after the barium meal the stomach was one-quarter filled with barium.

As surgical treatment was decided upon, his general condition, which was poor, required to be built up as rapidly as possible. Whilst he was capable of taking a moderate amount of food by mouth, it was considered advisable to give parenteral feeding as well in the form of human

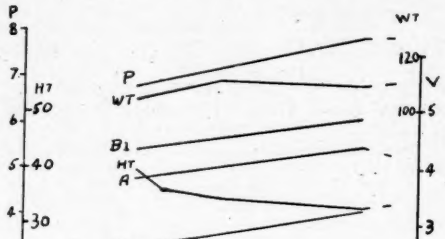

Figure IV.

Patient M.P. Wt = weight (pounds); Bl = blood volume and PL = plasma volume (scale V in litres); P = serum protein and A = serum albumin (grammes *per centum*); Ht = hæmatocrit value (volumes *per centum*); N = nitrogen balance (grammes of nitrogen per day); plain area = food given by mouth; cross-hatched area = serum given intravenously; stippled area = urine and fæces.

serum. This was commenced on August 26, 1947, and about 950 millilitres were given per day for six days. A rest from intravenous therapy was given for a week, and then, over a period of four days, a further 3800 millilitres were given. During the whole period of observation a large amount of protein was given by mouth, mainly in the form of whole milk powder and eggs. An average of about 270 grammes of protein was given daily by mouth in this way.

TABLE V.
Case IV.

Date.	Nitrogen Intake. (Grammes.)			Nitrogen Output: Daily Average. (Grammes.)			Daily Average Nitrogen Balance. (Grammes.)
	Food.	Serum.	Total.	Urine.	Fæces.	Total.	
22/8/47	7·8	—	7·8	5·8	0·9	6·7	+1·1
23/8/47	7·8	—	7·8	5·8	0·9	6·7	+1·1
24/8/47	7·8	—	7·8	5·8	0·9	6·7	+1·1
Total..	—	—	23·4	17·4	2·7	20·1	+3·3
25/8/47	7·8	17·8	25·6	4·65	0·8	5·45	+17·1
26/8/47	7·8	13·1	20·9	4·65	0·8	5·45	+17·1
27/8/47	7·8	8·4	16·2	4·65	0·8	5·45	+17·1
28/8/47	7·8	19·6	27·4	4·65	0·8	5·45	+17·1
Total..	—	—	90·1	18·6	3·2	21·8	+68·3
29/8/47	7·8	—	7·8	3·75	0·75	4·5	+3·3
30/8/47	7·8	—	7·8	3·75	0·75	4·5	+3·3
31/8/47	7·8	—	7·8	3·75	0·75	4·5	+3·3
1/9/47	7·8	—	7·8	3·75	0·75	4·5	+3·3
Total ..	—	—	31·2	15·0	3·1	18·1	+13·1
Total 25/8/47 to 1/9/47	—	—	121·3	—	—	39·9	+81·4

The weight gain amounted to twelve pounds. The results of the investigations carried out are shown in Tables VI and VII and in Figure V.

On October 9, 1947, operation was performed, and pronounced pyloric stenosis found. A simple gastro-enterostomy was performed, and the convalescence was satisfactory, the patient being allowed up on the second post-operative day.

Comment.

On his admission to hospital this man was in no state to face the risk of a major abdominal operation. In view of his difficulty with the ingestion of food, it was decided to supplement food intake by mouth with intravenous alimentation. As it turned out, he was capable of taking large quantities of protein by mouth, which makes the use of serum appear superfluous. It is remarkable also that he tolerated his diet as he did because it necessarily contained an approximately equal quantity of fat. At the particular time it was not possible to obtain powdered skim milk. No reactions were experienced, although local venous thrombosis commenced to appear after five days' intravenous therapy. On most days only one litre of serum was given. On one occasion two litres were given, with the production of some headache. After the completion of the first series of injections it was noted that he had a small degree of ascites. This is difficult to explain on physiological grounds, but it disappeared rapidly in two days. As was noticed in the previous case, there was a fall in the urinary nitrogen excretion during or following the administration of serum. It was not noticeable in the interval (August 26 to August 29, 1947), because the protein intake had been increased at this stage as well. The increase in circulating protein nitrogen amounted to 15·5 grammes, and this represented 3% of the total nitrogen (527·9 grammes) retained during the same time. The nitrogen given intravenously in the form of serum represented only 10% of the total nitrogen introduced during the experimental period.

CASE VI.—F.H.T., a male patient, aged fifty-five years, was admitted to the Royal Prince Alfred Hospital, Sydney, on August 13, 1947, with a diagnosis of general peritonitis, the symptoms of which had been present for only six hours. At operation the diagnosis was confirmed, and a localized abscess was present in the left iliac fossa. The appendix, stomach and duodenum were normal. Post-operatively he was treated with penicillin given parenterally, glucose-saline solution given intravenously, and Wangensteen suction drainage of his stomach. With a moderately stormy convalescence he progressed well until September 9, when the wound broke down partly without much evidence of infection. It was resutured the following day, and two days later he developed persistent hiccups and vomiting. There was no definite explanation of why this occurred, but he rapidly became dehydrated, and the intravenous administration of glucose-saline solution and Wangensteen drainage were recommenced. He was given a blood transfusion on September 16, and on September 17 it was decided to give him human serum intravenously as his condition had become desperate. Four and a half litres were given over a period of four days, and then he was well enough to commence

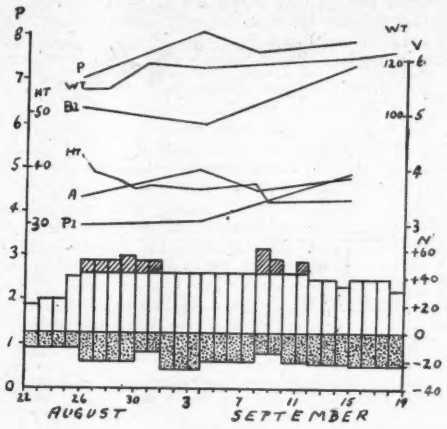

Figure V.

Patient F.H.P. Wt = weight (pounds); BL = blood volume and PL = plasma volume (litres); P = serum protein and A = serum albumin (grammes *per centum*); Ht = hæmatocrit value (volumes *per centum*); N = nitrogen balance (grammes of nitrogen per day); plain area = food given by mouth; cross-hatched area = serum given intravenously; stippled area = urine and fæces.

taking a powdered skim milk mixture and other fluids by mouth. By September 21 his condition was much improved, and by September 24 he was able to take ordinary food again. The results of investigations carried out are shown in Tables VIII and IX and in Figure VI.

Comment.

In the desperate condition in which this man was on September 17, the intravenous use of serum or repeated blood transfusion was probably the only life-saving measure to be used. Further blood transfusion was not desirable on account of the high hæmatocrit value. The

TABLE VI.
Case V.

Date.	Corrected Hæmatocrit Value. (Volumes *per Centum*.)	Serum Protein. (Grammes *per Centum*.)	Serum Albumin. (Grammes *per Centum*.)	Plasma Volume. (Litres.)	Blood Volume. (Litres.)	Circulating Serum Protein Nitrogen. (Grammes.)	Weight. (Pounds.)
26/8/47	42·3	7·01	4·31	2·91	5·04	32·6	10·8
27/8/47	39·3	—	—	—	—	—	—
28/8/47	38·5	—	—	—	—	—	—
29/8/47	38·0	—	—	—	—	—	—
30/8/47	36·7	—	—	—	—	—	—
31·8·47	37·0	—	—	—	—	—	118
4/9/47	36·5	8·07	4·92	3·04	4·78	39·2	116
8/9/47	37·5	7·62	4·57	—	—	—	—
9/9/47	34·0	—	—	—	—	—	118
15/9/47	34·6	7·88	4·84	3·82	5·84	48·1	120
18/9/47	—	—	—	—	—	—	122
21/9/47	—	—	—	—	—	—	120
24/9/47	—	—	—	—	—	—	120

serum had the desired effects of raising the blood volume and also of supplying the much-needed protein. No doubt hypoprotinæmia, as a result of the preceding illness, contributed towards the breakdown of the abdominal wound. The true effect of the intravenous administration of serum on the urinary output of nitrogen cannot be gauged, as the dietary intake of protein was increased to 180 grammes per day immediately after the serum. However, as the urinary nitrogen output was increased by only 50%, it may be assumed that the serum at least did not cause any increase. There were no reactions to the serum, but again venous thrombosis occurred. The increase in the circulating protein nitrogen was 3·9 grammes, and this represented 4·5% of the total retained nitrogen of 87·3 grammes. The nitrogen introduced as serum represented 28% of the total nitrogen administered during the experimental period.

Conclusions.

1. The administration of human serum is an efficient method of restoring the blood volume in states of non-traumatic shock. In these conditions it may often be a

TABLE VII.
Case V.

Date.	Nitrogen Intake. (Grammes.)			Nitrogen Output: Daily Average. (Grammes.)			Daily Average Nitrogen Balance. (Grammes.)
	Food.	Serum.	Total.	Urine.	Fæces.	Total.	
22/8/47	19·8	—	19·8	11·3	0·4	11·7	+15·0
23/8/47	23·6	—	23·6	11·3	0·4	11·7	+15·0
24/8/47	23·6	—	23·6	11·3	0·4	11·7	+15·0
25/8/47	39·9	—	39·9	11·3	0·4	11·7	+15·0
Total[1] ..	—	—	106·9	45·4	1·5	46·9	+60·0
26/8/47	43·1	9·25	52·35	20·1	1·3	21·4	+31·6
27/8/47	43·1	9·25	52·35	20·1	1·3	21·4	+31·6
28/8/47	43·1	9·25	52·35	20·1	1·3	21·4	+31·6
29/8/47	43·1	12·05	55·15	20·1	1·3	21·4	+31·6
Total..	—	—	212·2	80·3	5·2	85·5	+126·7
30/8/47	43·1	9·25	52·35	12·8	1·8	14·6	+37·7
31/8/47	43·1	9·25	52·35	12·8	1·8	14·6	+37·7
Total..	—	—	104·7	25·7	3·6	29·3	+75·4
1/9/47	43·1	—	43·1	24·2	2·3	26·5	+16·6
2/9/47	43·1	—	43·1	24·2	2·3	26·5	+16·6
3/9/47	43·1	—	43·1	24·2	2·3	26·5	+16·6
Total..	—	—	129·3	72·6	6·9	79·5	+49·8
4/9/47	43·1	—	43·1	18·8	1·8	20·5	+22·5
5/9/47	43·1	—	43·1	18·8	1·8	20·5	+22·5
6/9/47	43·1	—	43·1	18·8	1·8	20·5	+22·5
7/9/47	43·1	—	43·1	18·8	1·8	20·5	+22·5
Total..	—	—	172·4	75·0	7·2	82·2	+90·2
8/9/47	43·1	18·5	61·6	13·1	1·8	14·9	+42·8
9/9/47	43·1	10·7	53·8	13·1	1·8	14·9	+42·8
Total..	—	—	115·4	26·2	3·5	29·7	+85·7
10/9/47	43·1	—	43·1	19·5	1·4	20·9	+26·0
11/9/47	43·1	7·8	50·9	19·5	1·4	20·9	+26·0
Total..	—	—	94·0	39·0	2·9	41·9	+52·0
12/9/47	38·8	—	38·8	20·3	1·2	21·5	+16·0
13/9/47	38·8	—	38·8	20·3	1·2	21·5	+16·0
14/9/47	34·9	—	34·9	20·3	1·2	21·5	+16·0
Total..	—	—	112·5	60·8	3·7	64·5	+48·0
15/9/47	38·8	—	38·8	21·5	1·6	23·1	+13·7
16/9/47	38·8	—	38·8	21·5	1·6	23·1	+13·7
17/9/47	38·8	—	38·8	21·5	1·6	23·1	+13·7
18/9/47	31·1	—	31·1	21·5	1·6	23·1	+13·7
Total ..	—	—	147·5	86·2	6·4	92·6	+54·9
Total 26/8/47 to 14/9/47	—	—	940·5	—	—	412·6	+527·9

[1] Any apparent inconsistency between the totals and the individual readings arises because for tabular purposes figures were adjusted to the nearest first decimal place.

TABLE VIII.
Case VI.

Date.	Corrected Hæmatocrit Value. (Volumes *per Centum.*)	Serum Protein. (Grammes *per Centum.*)	Serum Albumin. (Grammes *per* (*Centum.*)	Plasma Volume. (Litres.)	Blood Volume. (Litres.)	Circulating Serum Protein Nitrogen. (Grammes.)
17/9/47	47·0	6·24	4·20	3·00	5·65	29·9
20/9/47	43·2	—	—	—	—	—
25/9/47	36·8	6·38	4·41	3·31	5·25	33·8

life-saving procedure, and extension of its use in such conditions is advocated. There is evidence that in "medical shock" serum may also be a means of supplying much-needed protein.

2. Human serum appears to be an effective diuretic agent in conditions of oliguria or anuria of renal origin.

3. The administration of human serum is an efficient method of supplying protein for the correction of protein deficiency when protein cannot be supplied at all, or only in inadequate amounts by mouth.

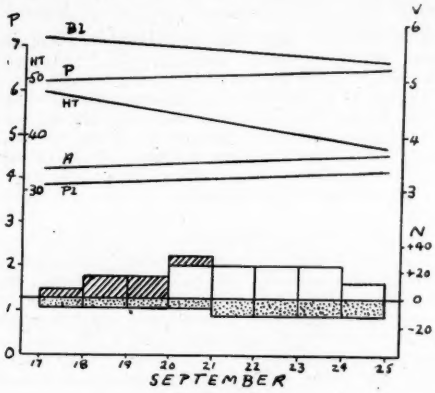

Figure VI.

Patient F.H.T. BL = blood volume and PL = plasma volume (scale V in litres); P = serum protein and A = serum albumin (grammes *per centum*); Ht = hæmatocrit value (volumes *per centum*); N = nitrogen balance (grammes of nitrogen per day); plain area = food given by mouth; cross-hatched area = serum given intravenously; stippled area = urine and fæces.

4. The advantages of serum for such purposes when compared with casein hydrolysates are as follows: (*a*) the relatively small volume of fluid necessary; (*b*) the relative absence of reactions; (*c*) the apparently efficient utilization, with even a fall in the urinary nitrogen output, during or after the administration of the serum. This fall in nitrogen output has also been reported by Kremen,[21] and suggests again that serum given in this way has a very high "biological value".

5. There are apparent disadvantages, as pointed out earlier in this paper, but they are not borne out by the results of these investigations. It is admitted that this may possibly be due to the nitrogen excretion's not having been followed for a sufficiently long period.

6. Protein given intravenously as serum is retained in the circulation in a higher proportion than protein given by mouth. This is in line with animal experiments carried out by Elman,[7] who has shown that in dogs 10% to 13% of the injected plasma protein remains in the circulation in conditions of hypoalbuminæmia, whereas only 3% to 4% is so distributed when the protein is given by mouth. In Case V, in which only 10% of the nitrogen was given intravenously as serum, the figure of 3% agrees well with those mentioned by Elman.[5]

7. It is hoped that in the future more human serum will be available for the treatment of medical or non-traumatic conditions as described in this paper.

Acknowledgements.

I wish to thank Professor C. G. Lambie, in whose department this work was carried out, for help and advice. My very grateful thanks are due to the chairman and committee of the Red Cross Blood Transfusion Service, who generously made serum available for the treatment of three of the patients mentioned and for the purpose of this investigation. I also wish to thank Professor H. R. Dew, Dr. Eric Susman and Dr. Frank Mills for permission to carry out the treatment and investigations on the respective patients under their care.

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TABLE IX.
Case VI.

Date.	Nitrogen Intake.			Nitrogen Output: Daily Average. (Grammes.)				Daily Average Nitrogen Balance. (Grammes.)
	Food.	Serum.	Total.	Urine.	Gastric Contents.	Fæces.	Total.	
17/9/47	—	7·2	7·2	6·2	0·3	—	6·4	+11·0
18/9/47	—	15·9	15·9	6·2	0·3	—	6·4	+11·0
19/9/47	—	15·9	15·9	6·2	—	—	6·4	+11·0
20/9/47	24·9	5·7	30·6	6·2	—	—	6·4	+11·0
Total	—	44·7	69·6	25·0	0·6	—	25·6	+44·0
21/9/47	24·9	—	24·9	9·9	—	1·2	11·1	+10·8
22/9/47	24·9	—	24·9	9·9	—	1·2	11·1	+10·8
23/9/47	24·9	—	24·9	9·9	—	1·2	11·1	+10·8
24/9/47	13·0	—	13·0	9·9	—	1·2	11·1	+10·8
Total	—	—	87·7	39·5	—	4·9	44·4	+43·2
Grand total ..	—	—	157·3	—	—	—	70·0	+87·3

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Reports of Cases.

TICK TYPHUS IN SOUTH QUEENSLAND: REPORT OF THREE CASES.

By G. E. W. STREETEN (Palmwoods), R. S. COHEN (Brisbane), N. M. GUTTERIDGE (Brisbane), N. B. WILMER (Gympie), and H. E. BROWN, D. J. W. SMITH and E. H. DERRICK (Queensland Health Department, Brisbane).

THE notable investigations of Andrew, Bonnin and Williams,[1] and of Funder and Jackson,[2] supported by Plotz *et alii*,[3] have established the presence in north Queensland of a variety of tick typhus. Brody[4] also has reported a case. The tick responsible is almost certainly *Ixodes holocyclus*, although efforts to obtain the infection from these ticks have so far been unsuccessful (Fenner).[5]

The following three cases show that tick typhus is present also in south Queensland.

Case I.

B.A.E., a male, aged thirty-nine years, lived on a farm at Montville, Queensland (26° 41′ south latitude, 152° 53′ east longitude, 1460 feet elevation, 74·65 inches average annual rainfall). The farm produced mainly pineapples with some citrus fruits, and supported a few dairy cattle. The land had originally been covered with rain forest or "scrub" and some scrub still remained uncleared.

Ticks were prevalent in the pineapple patches, particularly from September, 1946, to the end of December. On December 7, 1946, B.A.E. became aware of a tick embedded over his right scapula. The tick was removed the next day, and must have been attached, he thinks, for at least twenty-four hours. After its removal, the site of the puncture became very sore and swollen. "It came up like a boil." The tick unfortunately was not preserved. It was large with brown markings and was described as a "shellback". It was probably an adult *Ixodes holocyclus*.

He noticed no further symptoms until December 17. Then he began to feel ill. At first he felt generally out of sorts, with loss of energy, mild headache and nausea. He had a slight rigor, and at midday discovered his temperature to be 39·2° C. (102·5° F.). By nightfall the temperature had dropped to normal, but he still felt ill. Despite his symptoms he determined to travel to Brisbane on December 18. His temperature at 9 a.m. was 38·3° C. (101° F.). He had a fairly severe headache and was giddy. He alighted from the train at a wayside station for refreshments, then felt decidedly confused as to the position of his carriage, finally boarding the train "somewhere". During the day he felt also soreness of the eyes and pains all over his body.

The same symptom complex continued until he came for treatment to one of us (G.E.W.S.) on December 24. Unfortunately he had taken no further recordings of temperature, but stated that he felt "hot" at regular intervals during the week, which suggested a swinging pyrexia.

On December 24 symptoms were abating, his headache being the most persistent. He complained of a severe degree of anorexia with occasional nausea but no vomiting. He had developed a rash during the week. There was no history or sign of cardio-vascular, respiratory or urinary disorder.

On examination his temperature was 37·8° C. (100° F.) and pulse rate 84 per minute. The blood pressure was 130 millimetres of mercury (systolic) and 80 millimetres (diastolic). The tongue was furred; the fauces were clean. The abdomen was soft on palpation; no masses were noted. The spleen and liver particularly were examined for any enlargement, but none was found. There was conjunctival injection in both eyes. The central nervous system was clear.

The rash was macular, papular and petechial. There was a preponderance of pale pink macules with occasional

papules, and one or two patches of petechiæ. The lesions were discrete and sparse. The chest, abdomen, back and thighs were affected. The face was clear, while the arms and legs were affected slightly.

Most noticeable was a large eschar over the right scapula at the site of the tick bite. The surrounding area was still swollen. There was one small lymph gland palpable in the right axilla, but none noticeable elsewhere.

The patient did not wish to be admitted to hospital and was given symptomatic treatment at his home.

On December 31, by which time he was almost well again, a sample of serum was obtained and forwarded to the laboratory of the Queensland Health Department. Proteus OX19 was agglutinated to a titre of 160 (Table I).

TABLE I.

Agglutination Titres with Proteus; Queensland Health Department Laboratory.

Case.	Date.	Approximate Day of Disease.	OX2.	OX19.	OXK.
I	31/12/46	15		160	0
II	24/5/47	10	20	0	20
	29/5/47	15	40	320	40
III	3/7/47	10	0	20	0
	12/7/47	19	320	640	0

(In the tests the standard technique was not adhered to.)

The other routine test organisms were not agglutinated. On January 14, 1947, the site of the eschar was still evident as a red depressed mark.

A partly engorged female *Ixodes holocyclus* was removed by B.A.E. from his dog on January 14, and on the following day several larval ticks, identified as a species of *Hæmaphysalis*, possibly *Hæmaphysalis bancrofti*, were obtained by dragging a rag through the scrub on his farm. These were inoculated into guinea-pigs without, however, producing a rickettsiosis.

The patient further stated that rats of both domestic and field varieties had been seen, but were not plentiful. Bandicoots and other animals abounded in the scrub. About six weeks prior to his illness fleas had been numerous.

Case II.

Mrs. V., aged forty-six years, a housewife, of Ashgrove, a suburb of Brisbane, spent a week at Mount Tamborine (27° 56′ south latitude, 153° 12′ east longitude, 1800 feet elevation, 57·09 inches average annual rainfall). She arrived there on May 10, 1947, and next day walked in the "scrub" where she was attacked by leeches. She was not aware of any tick bite. On May 14 she noticed an eruption on the left side of the forehead like a "blind pimple". It contained no pus. On May 15 she had a headache all day.

On May 17 she returned to Brisbane, and on this and the next day complained of aching across the back of the neck and shoulders. On May 19 she became quite ill with aching head and "rheumatic pains" all over. On May 20 she was better and felt well enough to attend the surgery of one of us (R.S.C.). Typhus infection was suspected from the appearance of the eschar and from the enlarged pre-auricular, mastoid and upper cervical lymph glands. She was referred to one of us (N.M.G.) for pathological investigation.

Her head became tender all over and the pressure of the pillow was painful. Axillary and inguinal glands did not become palpable. During the next few days she felt hot intermittently, the temperature reaching 38·3° C. (101° F.) on one occasion. On May 25 she had a severe headache, but was afebrile. She got up from bed on May 28. At no time was a rash noticed.

On May 24 examination showed an eschar on the forehead above the left eye. The leucocytes numbered 2400 per cubic millimetre (neutrophile cells 52%, lymphocytes 42%, monocytes 6%). Serum tests (Table I) showed slight agglutination with Proteus OX2 and OXK, but none with the other usual test organisms. Blood was incubated in broth and inoculated into a guinea-pig, in each case without result.

By May 29 the titre of agglutination with Proteus OX19 had risen to 320. The site of the eschar was still evident as a desquamated area, surrounded by a brownish red zone; the lesion was healing.

Her convalescence was uneventful.

Case III.

W.T.M., a male, aged twenty-eight years, was a forestry worker at Amamoor (26° 21′ south latitude, 152° 41′ east longitude, 223 feet elevation, 44·43 inches annual rainfall). On June 22, 1947, he was bitten on the scalp by a "shell-back scrub tick". On June 27 he sought advice from one of us (N.B.W.) because of symptoms of an "influenza" of two or three days' duration. There was an eschar at the site of the bite and marked cervical adenitis. He complained of fever, headache and neck pains. His temperature was 38·9° C. (102° F.). Next day his colour was ghastly and he looked very ill. He had an associated pansinusitis with bilateral antral opacity. Admission to hospital was advised, but bed space was unobtainable till the following day, June 29.

The pyrexia persisted for the next two days, the temperature becoming normal on July 2. On July 1 he developed a blotchy rash on face, trunk and arms. This lasted a little over forty-eight hours and disappeared without desquamation. On July 2 his liver and spleen were both found to be tender and to be enlarged to one finger's breadth below the costal margin. This enlargement could no longer be detected on July 5.

Serum samples were obtained on July 3 and 12. The latter agglutinated Proteus OX19 and OX2 (Table I).

Discussion.

The serum agglutination with Proteus OX19 indicates that these were cases of either murine typhus or tick typhus. In the first and third cases the definite history of tick bite, the presence of an eschar, the mildness of the illness and the rural locality make the diagnosis of tick typhus beyond reasonable doubt. In the second case murine typhus cannot be excluded, for the patient had been in the city during a period consistent with the incubation period of murine typhus (rats and mice are occasionally seen in the vicinity of her home); and further no tick was seen. Nevertheless the eschar, the lymphadenitis, the association with a visit to scrub country and the comparative mildness of the illness make tick typhus the probable diagnosis. The clinical histories of the three cases are consistent with the descriptions of Andrew, Bonnin and Williams.

It is likely that, in the past, a number of cases of tick typhus have been regarded, because the sera have agglutinated Proteus OX19, as murine typhus.

It is impossible to say, until south Queensland strains of the rickettsia are isolated and compared, what relation the tick typhus in south Queensland bears to that in north Queensland. It is probable that they are closely related, if not identical, for it is the same tick, *Ixodes holocyclus*, that is notorious in both parts of Queensland for attacking man.

Acknowledgement.

We are indebted to Mr. A. S. Richards, Deputy Director of Meteorological Services, for the rainfall figures.

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Reviews.

THE MENTAL GROWTH OF THE CHILD.

THE second edition of "Developmental Diagnosis" by Arnold Gesell and Catherine S. Amatruda is the fruit of many years' work at the Yale clinic of child development.[1]

The authors give very detailed descriptions of the normal patterns of behaviour at the ages of four, sixteen, eighteen and forty weeks and twelve, eighteen, twenty-four and thirty-six months.

Behaviour is divided into four fields: (*a*) motor, which covers motor coordination, posture, balance, sitting, standing and walking; (*b*) adaptive, which covers finer adjustments to objects and situations; (*c*) language, which includes all visible and audible forms of communication; (*d*) personal-social behaviour, which comprises the child's personal reactions to the social structure in which he lives. Methods of examination are given in great detail with many pictures.

Part two deals with defects and durations of developments in regard to amentia, convulsions, cerebral injury, blindness, deafness and precocity. Part three deals with the protection of early child development in so far as correct diagnosis and guidance are ensured.

This extremely detailed work, as regard normal and abnormal mental growth of the young child, would be an excellent reference work for all who are concerned with child-health guidance and education.

THE BORDERLAND OF PSYCHIATRY AND MEDICINE.

"MEDICINE, PSYCHIATRY AND THEIR BORDERLAND" by Dr. Alexander Frank is largely a record of the personal impressions of the author on such subjects as case taking, diagnosis, experimental research and statistics.[2] These subjects form the first four of the eight chapters of the book.

Much of the material is introduced in paragraph form and is condensed in the manner of a diary. The ideas are not developed in logical sequence and the author frequently switches from one thought to another and from one tense to another to such a degree that the central idea is obscured.

The author is evidently a man of wide reading and considerable erudition and has some worthwhile ideas to convey. It is a pity he has, as he states in the preface, "departed from austere scientific language" and used "figurative language" since the continuity of his argument is too often lost in a welter of explanation and illustration. The appeal and usefulness of the book are greatly limited by over-condensation of the material, too ready generalization, and an unscientific method of presentation.

SURGERY IN SYNOPSIS.

AFTER an interval of only two years there has appeared another edition of Hey Groves's "A Synopsis of Surgery"[3] edited by Cecil P. G. Wakeley. The book must always be of value to the examination student who wishes to absorb as much detail as possible in the shortest space of time. Our general remarks regarding the previous edition still apply to this one. While there are compactness and clarity, there are occasional instances of wrong emphasis. The worst example of this is still the very poor description of burns and their treatment and the detail and space devoted to cleft palate. Owing, no doubt, to lack of space, there is still a lack of explanation for the reasons or certain treatment.

Despite the general high standard of presentation and the lucidity and accuracy of detail, one can, as in every textbook, find fault with what may seem to some to be relatively unimportant points. Extradural hæmorrhage still has pride of place amongst the varieties of intracranial hæmorrhage. Non-specific urethritis is still classed as "very rare". The author should have been a regimental medical officer during the recent war. The toxic goitre has not been reprieved from the penalty of twenty minims of Lugol's iodine three times daily. On page three we are forewarned of three methods of producing passive hyperæmia, but are disappointed to find but two described. Penicillin appears to have earned no place in the treatment of syphilis. In the section on actinomycosis, penicillin is not considered a suitable therapeutic agent, but actinomycosis is listed in the section on penicillin as an indication for its use. The treatment suggested for varicose veins is certain to be followed by many failures. There is not only one position of the hand in ulnar nerve lesions; the appearances vary according to the site of injury. The investigation of the urinary hormone is not mentioned in the section on testicular tumours, and to say that "Castration is of little use and is now abandoned" is nonsense. Nor can we admit in this country that intussusception is never treated by enemata.

In spite of its minor faults the book is recommended to students as an examination aid.

PHYSICAL DIAGNOSIS.

THE third edition of the "Manual of Physical Diagnosis" by Ellis B. Freilich and George C. Coe has recently been issued by the Year Book Publishers, of Chicago.[1] The full title of the work carries the addendum "with special consideration of the heart and lungs", and of the book's 351 pages, 290 are devoted to these two systems, so that it can readily be appreciated that the other systems receive only scant attention. This rather detracts from the value of the book from a student's angle as he needs all systems dealt with equally. Sixteen pages only are considered adequate to cover the nervous system, but the only details are a rather jumbled account of the examination of the cranial nerves together with brief descriptions of the main reflexes; from a clinical viewpoint it would be very difficult to examine the nervous system using this book as a guide. In contrast to the above, very complete details of the physical examination of the heart and lungs are given; these chapters would prove of great assistance to all clinical teachers, and all the merits of this book lie in them. If further printings are made it is to be hoped that the authors will either devote the book entirely to the heart and lungs or else bring the standard of the chapters upon the other systems into line by greatly expanding them.

LA DOULEUR.

THE French publications entitled *"Que sais-je?"*, now over 250 in number, deal in a concise though not always popular manner with a variety of topics under such headings as science, pure and applied, history, literature, fine arts, and indeed any subject to which educated people are responsive. They are all handy little volumes, supposedly written by experts, and all cheap. The last to arrive is *"La Doleur"*, by Dr. Paul Chauchard.[2] The general plan of this booklet is admirable; the first part is devoted to the physiology of pain and includes the cutaneous receptors, the conduction of the impulses and the centres in the higher levels of the nervous system. The second part deals with the pathology of pain and includes visceral pain, the neuralgias and pain arising in the nerve centres. The third part is concerned with the alleviation of pain beginning with a short but commendable history of anæsthesia; then come the therapeutics and surgery of pain, psychopathic treatment and finally several conclusions. The design is praiseworthy, but unfortunately there are outstanding shortcomings. Whatever lessons France has to give the rest of the world, accuracy of statement, scholarship and detachment from insular discrimination are not amongst them. The author, like most Frenchmen, trips over proper names—Simpson becomes Stimson, Humphry Davy appears as Humphrey Davy, and even the French Baudelaire masquerades as Beaudelaire.

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[1] "Developmental Diagnosis: Normal and Abnormal Child Development: Clinical Methods and Pediatric Applications", by Arnold Gesell, M.D., and Catherine S. Amatruda, M.D.; Second Edition; 1947. New York and London: Paul Hoeber Incorporated. 9¼" × 6", pp. 514. Price: $7.50.

[2] "Medicine, Psychiatry and their Borderland", by Alexander Frank, M.D.; 1947. London, Sydney and New York: Shakespeare Head Press Proprietary, Limited. 8¼" × 5½", pp. 238. Price: 21s.

[3] "Hey Groves' Synopsis of Surgery Illustrated", edited by Sir Cecil P. G. Wakeley, K.B.E., C.B., D.Sc., F.R.C.S., F.R.S.E., F.A.C.S., F.R.A.C.S.; Thirteenth Edition; 1947. Bristol: John Wright and Sons, Limited. London: Simpkin Marshall (1941), Limited. 7¼" × 4¾", pp. 648, with illustrations. Price: 25s.

[1] "Manual of Physical Diagnosis: With Special Consideration of the Heart and Lungs", by Ellis B. Freilich, M.D., F.A.C.P., and George C. Coe, M.D., revised in collaboration with Joseph K. Freilich, M.D.; Third Edition; 1947. Chicago: The Year Book Publishers, Incorporated. 8" × 5¾", p. 352, with many illustrations. Price: $5.00.

[2] *"La Douleur"*, by Paul Chauchard; 1947. Paris: Presses Universitaires de France. 6¾" × 4½", pp. 128, with illustrations.

Most of the investigators and writers to whom reference is made are Frenchmen little known outside their own country. The only English neurologists whom the author quotes are Head and Adrian; there is no mention of Sherrington, whose hypothesis of the naked nerve ending being the pain receptor has been most useful, nor does his very serviceable term "nociceptive" ever appear. The centre for the sensation of pain is declared to be in the cerebral cortex, but the fact that no one has ever succeeded in eliciting a painful feeling by stimulating the cortex in a conscious human patient is conveniently ignored. Head's postulate that loss or reduction of cortical control of the thalamus, through lesion of the cortico-thalamic tract, leads to the intense pain of the thalamic syndrome is mentioned, only to be rejected; according to the author the normal thalamus acts as a filter, allowing only a certain modicum of pain impulses to be sent up to the cortex, whereas in the thalamic syndrome its filtering action is absent and so the entirety of pain impulses is projected upon the sensory cortex.

In the section dealing with morphine the reader will find the following: *"Grâce à ce pouvoir analgésique la morphine peut ainsi rendre possible le sommeil quand la douleur était la cause de l'insomnie."* This obvious utterance may be taken as typical of much of the booklet.

DISEASES OF CHILDREN.

"A HANDBOOK ON DISEASES OF CHILDREN", by Dr. Bruce Williamson, has been republished in its fifth edition.[1] It is a concise compendium of pædiatric information for use as a vade-mecum by medical students and practitioners and, in the main, is reliable and should serve its purpose.

The illustrations including the summaries and groupings are admirable features, and towards the end of the book there is a formulary which now includes data concerning penicillin, sulphonamides, streptomycin and reference to gramicidin, the new antibiotic for use as a wound dressing.

Sulphanilamide, ten grains morning and evening, is advocated for children over eight years of age for diminishing the frequency of rheumatic attacks. Reference is also made to the efficacy of a combination of salicylates and penicillin in severe pericarditis.

The cardiological section of the book is especially authoritative, but it is surprising to learn (on page 283) that during convalescence long rest in bed for patients with rheumatic heart affections "is now considered unsound practice".

For angioneurotic and urticarial conditions "Benadryl" is recommended, the dosage being two milligrammes per pound of body weight, and the ensuing drowsiness if encountered "is met by caffein or ephedrine".

For a book of this kind to continue in favour it is essential that further editions should be available to keep the subject matter abreast of recent advances. The author and publishers are showing admirable enterprise in this respect. Each new edition contains revised and supplemental material, but there are places such as the section on infant mortality where the information is lagging behind the times. The book is already large enough and further space should be found by pruning away the dead wood in the course of the preparation of the next edition.

PRACTICAL CLINICAL PSYCHIATRY.

PUBLISHED first in 1925, the appearance of the sixth edition of "Practical Clinical Psychiatry" by Strecker, Ebaugh and Ewalt witnesses the popularity that the book has merited in the past two decades.[2] It is dedicated to the late Professor Adolf Meyer and therefore follows the psychobiological concepts of that eminent teacher. It is a book for the specialist and for the student in psychiatry, however, rather than for the general practitioner. Following Meyer, the authors discard the rather static terms of syndrome or disease, and use the more dynamic "reaction type" in describing the symptom complexes.

An early chapter regards as a step forward the classification of psychiatric disorders as adopted by the United States Army—a complex classification which appears to be too unwieldy to be practical.

The organic reaction types are well described, emphasis wisely being placed upon those disorders that are amenable to therapy. The penicillin treatment of neurosyphilis is included, but its efficacy is regarded as non-proven, and the fever treatments are described in detail. Epileptic psychoses are well described; however, a word of warning as to the toxicity of "Tridione" could have been included with advantage. It is pleasing to note that the authors have had the courage to advise electroconvulsive therapy in the treatment of depressions and agitation associated with cerebral arteriosclerosis.

The chapter on toxic psychosis includes a detailed discussion of the various psychiatric disorders associated with alcohol; it stresses the combination of paraldehyde, insulin and large doses of vitamin *B* complex in the detoxifying process.

The description of the affective reaction types is adequate, but contains little that is new. However, it stresses the value of psychotherapy in assisting to prevent recurrences in this condition. Prefrontal leucotomy is briefly mentioned, but the authors prefer to emphasize the dangers and contra-indications rather than the therapeutic results.

The influence of Bleuler is patent in the description of the schizophrenic reaction types. The authors prefer insulin coma in the treatment of these patients. Wise advice is given concerning the management of children showing evidence of the schizoid personality. It is interesting to note that paraphrenia is not regarded as a psychiatric entity.

The neuroses are described according to the usual psychobiological concepts, but more detailed description of psychotherapeutic measures would be beneficial. One weakness throughout the book is the omission to give any details of the recommended dosage of the various sedatives *et cetera* that are described.

There is an excellent bibliography attached to each chapter and the illustrations and photomicrographs are clearly reproduced.

A SYNOPSIS OF HYGIENE.

AMONG the most useful of the smaller textbooks on public health and hygiene is Jameson and Parkinson's "Synopsis of Hygiene", which was first published in 1920. It is not well named, for whatever it may have been when it first appeared, it is now far more than a mere synopsis. The appearance of a ninth edition is evidence of the rapidity with which preventive medicine and social services are nowadays developing. Great changes have taken place in the social legislation of England and Wales since the eighth edition was published in 1944. As a result the chapters (Section IX) which deal with public health law have been considerably expanded.

These chapters have only an indirect value to Australian students in that in matters of detail they do not apply to local conditions, but to those who study the trend of affairs in respect of the future of the profession in this country they will be most useful.

The *Education Act* of 1944 and the regulations made thereunder have been included in Section III, whose chapters deal with maternal and child welfare, while the portion of the volume dealing with hospital developments (part of Section II) has been largely rewritten.

The volume is divided into nine "sections", each containing several "chapters", and five appendices. Section I begins with a brief but very complete historical survey of the development of modern public health activities. The remaining sections cover the whole field of public health and hygiene. In perusing the book the reader gains the impression that the authors have aimed at giving proportionate space to each aspect of the subject. This has necessarily involved condensation, but one never feels that essentials have been sacrificed to brevity. Section IV, on nutrition and food, is particularly well balanced and complete.

Much factual information has been included in the five appendices, not the least useful of which is that on

[1] "A Handbook on Diseases of Children: Including Dietetics and the Common Fevers", by Bruce Williamson, M.D. (Edinburgh), F.R.C.P. (London); Fifth Edition; 1947. Edinburgh: E. and S. Livingstone, Limited. 7¼" × 4¾", pp. 420, with many illustrations. Price: 15s.

[2] "Practical Clinical Psychiatry", by Edwards A. Strecker, A.B., A.M., Sc.D., Litt.D., LL.D., M.D., Franklin G. Ebaugh, A.B., M.D., and Jack R. Ewalt, M.D.; Section on Psychopathologic Problems of Childhood, by Leo Kanner, M.D.; Sixth Edition; 1947. Philadelphia and Toronto: The Blakiston Company. 9" × 6", pp. 486, with illustrations. Price: $5.00.

[1] "A Synopsis of Hygiene (Jameson and Parkinson)", by G. S. Parkinson, C.B.E., D.S.O., M.R.C.S., L.R.C.P., D.P.H., Brig. R.A.M.C. (Ret.), assisted by Kathleen M. Shaw, M.B.E.; Ninth Edition; 1947. London: J. and A. Churchill, Limited. 8½" × 5½", pp. 800, with illustrations. Price: 28s.

elementary physics, calculations, factors and conversion tables, a "memory refresher" which it is particularly convenient to have included in a work of this nature.

As in previous editions bibliographical references are interpolated at the ends of each portion dealing with a particular topic, rather than included at the end of each large section, or in the form of footnotes. This feature makes for easy and uninterrupted perusal.

The present edition is the work of G. S. Parkinson, who is now assisted by Kathleen Shaw, of the London School of Hygiene and Tropical Medicine.

This volume is clearly printed on a good paper and is well indexed. There are sixteen illustrations, which, however, add little to the value of the work, and could have been omitted without any impairment of its usefulness.

Besides being an informative textbook for candidates for the Diploma of Public Health it is a valuable work of reference suitable for inclusion in the hygiene section of any medical library.

EXPERIMENTAL PHYSIOLOGY.

THE fourth edition of D. T. Harris's "Experimental Physiology for Medical Students" appears six years after the third edition.[1] The book retains its original character of an instruction book for students who are acquiring techniques which might be useful in experimental physiology. It is essentially a students' laboratory manual. The techniques are well selected and the exercises when carried out would appear to be instructive. The writing is in many cases loose. For instance, on page 16, speaking of a 10 cubic centimetre all glass syringe, the specification is: "The piston should be smooth and should permit air to be drawn in at the same time as the blood." Some of the information which is given about normal values appears to be at least questionable. On page 21 the average normal number of red blood cells for man is given as six million red cells per cubic millimetre. We do not know of any data upon which such a statement could be based. On page 31 there is an apparent differentiation between "coagulation time" and "clotting time". These are just examples of the lack of precision which occurs in the book. As suggested in the review of the previous edition, this book will be useful in those schools which are copiously equipped with apparatus and wish to give students instruction in the use of it.

Notes on Books, Current Journals and New Appliances.

THE SURGICAL CLINICS OF NORTH AMERICA.

THE last three volumes of *The Surgical Clinics of North America* have been received. This publication is issued every two months. The copies that have come to hand include those of June, 1947, from the Lahey Clinic, August, 1947, from the Mayo Clinic and October, 1947, from the Massachusetts General Hospital. The Lahey Clinic number consists of a symposium on tumours. Tumours of many regions are dealt with. Illustrations are included, but these consist chiefly of surgical diagrams and reproductions of X-ray photographs; the number of photomicrographs included is small. The Mayo Clinic number comprises a symposium on gynæcology, but it also deals with a fairly wide range of other subjects. The number emanating from the Massachusetts General Hospital contains contributions from the different surgical departments of the institution. The subjects dealt with comprise general surgery, plastic surgery, thoracic surgery, surgery of tumours, surgery of the vascular system, endoscopy, neurosurgery, orthopædic surgery, urology and dentistry. Each of these numbers concludes with a cumulative index.

THE MEDICAL CLINICS OF NORTH AMERICA.

THE last four numbers of the well-known publication *Medical Clinics of North America* have been received. The numbers are those of May, July, September and November, 1947. The May, 1947, issue is a "New York Number" and deals with pædiatrics; the July issue is a "Mayo Clinic Number" and contains, *inter alia*, a symposium on blood transfusion and the Rh factor. The September issue is a "Boston-Number" and consists of a symposium on specific methods of treatment. The November issue is a "Philadelphia Number" and is devoted almost entirely to a symposium on diseases of the respiratory system. Each number concludes with a cumulative index.

WORK AT THE MAYO CLINIC.

As is well known, a great deal of work is carried out every year at the Mayo Clinic. It has been customary for some years to publish an annual volume of "Collected Papers" from the Mayo Clinic and the Mayo Foundation.[1] This is done to meet the requirements of the general practitioner, the general surgeon and the diagnostician. From December 1, 1945, to November 30, 1946, 759 papers were available, and Volume XXXVI of the "Collected Papers" contains 56 of these reproduced in full, 93 published in an abridged form, 48 dealt with by abstract and 477 recorded only by their titles.

The work is divided into several sections dealing respectively with: the alimentary tract; gastro-urinary diseases; ductless glands; the blood and circulatory organs; the skin and syphilis; the head, trunk and extremities; the chest; the brain; spinal cord and nerves; radiology and physical medicine; anæsthesia and gas therapy. The last is a miscellaneous section. This book will be found useful by those for whom it is intended.

A YEAR BOOK OF DIAGNOSIS AND TREATMENT.

THE "Modern Treatment Year Book, 1947", has been issued by The Medical Press, London.[2] It is described as "A Year Book of Diagnosis and Treatment for the General Practitioner". The work is so well known that medical practitioners require no introduction to it. This year the range of subjects covers a wide ground. Among the 44 chapters will be found articles dealing with such subjects as the treatment of influenza, penicillin treatment in surgical conditions of the chest, treatment of toxæmias of pregnancy, the treatment of pulmonary tuberculosis in the young adult, the treatment of tuberculous empyema, the treatment of cholecystitis, the treatment of puerperal sepsis, the treatment of gout, the treatment of acne, the diagnosis and treatment of functional menstrual disorders, the treatment of pneumonia and the treatment of acute nasal sinusitis. The authors of the articles have been selected from those holding public hospital appointments. The volume has been edited by Sir Cecil Wakeley, who is to be congratulated on the volume and its contents.

ILLUSTRATIONS OF REGIONAL ANATOMY.

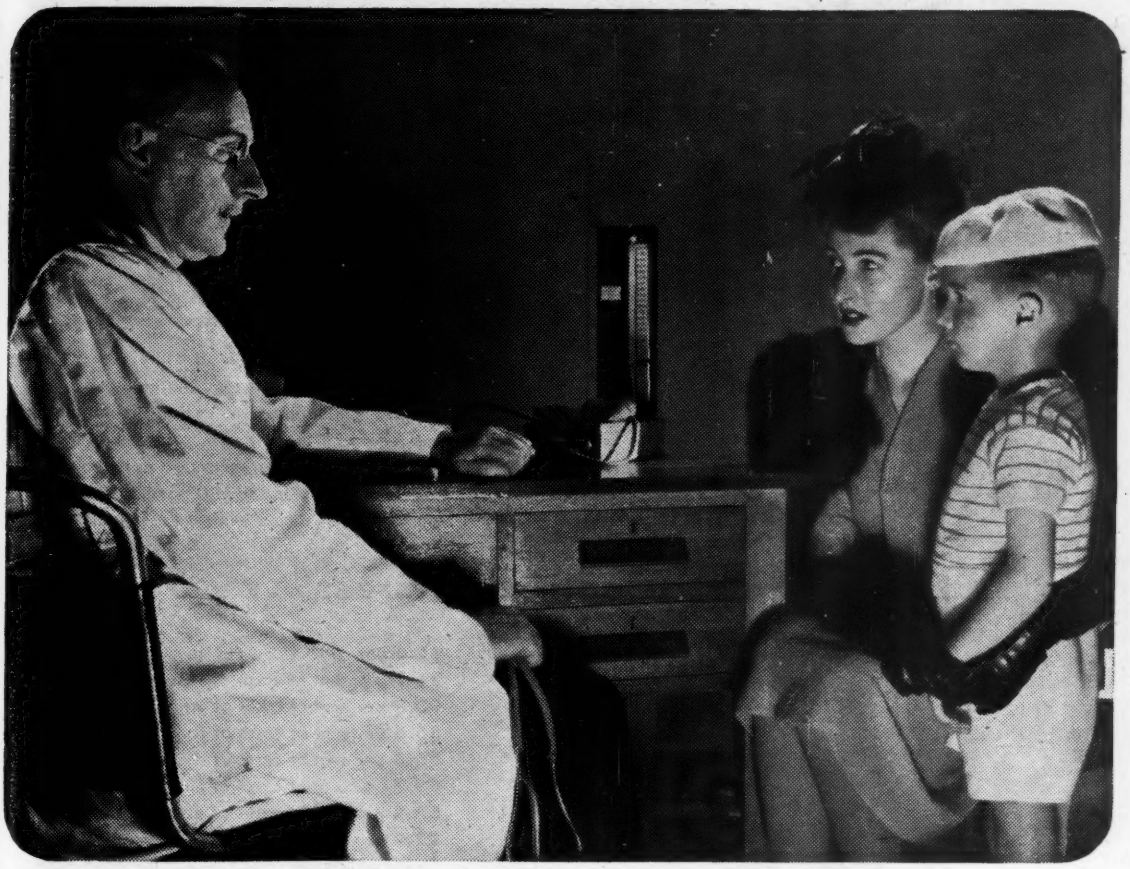
FOR many years E. B. Jamieson's "Illustrations of Regional Anatomy" has been available. The work has now reached its seventh edition[3] and bears the date August, 1947. The sixth edition was published in January, 1946. The work is available in seven separate sections and is also published as a single volume; there is no need to describe it in detail. It consists of more than three hundred pages of coloured illustrations of serial dissections of the different parts of the human body; these are clear and of first-rate quality. In October, 1944, a fire, which occurred while the sixth edition was in the press, caused a great deal of damage to some of the blocks. These have been replaced and some minor corrections that were necessary have been made. This work as usual can be warmly recommended.

[1] "Experimental Physiology for Medical Students", by D. T. Harris, M.D., D.Sc., F.Inst.P.; Fourth Edition; 1947. London: J. and A. Churchill, Limited. 9¾" × 6¼", pp. 312, with many illustrations. Price: 18s.

[1] "Collected Papers of the Mayo Clinic and the Mayo Foundation", edited by Richard M. Hewitt, B.A., M.A., M.D., A. B. Nevling, M.D., John R. Milner, B.A., Carl M. Gambill, A.B., M.D., M.P.H., and Elizabeth L. Skafte, B.A.; Volume XXXVIII; 1947. Philadelphia and London: W. B. Saunders Company. Melbourne: W. Ramsay (Surgical) Proprietary, Limited. 9" × 6", pp. 926, with many illustrations. Price: 37s. 6d.

[2] "Modern Treatment Year Book, 1947: A Year Book of Diagnosis and Treatment for the General Practitioner", edited by Sir Cecil Wakeley, K.B.E., C.B., D.Sc., F.R.C.S., F.R.S.E., F.A.C.S., F.R.A.C.S. (Hon.); 1947. London: The Medical Press. 8½" × 5½", pp. 398, with illustrations. Price: 15s.

[3] "Illustrations of Regional Anatomy", by E. B. Jamieson, M.D.; Complete Volume, Seven Sections; Seventh Edition; 1947. Edinburgh: E. and S. Livingstone, Limited. 8" × 6", pp. 362, with many coloured illustrations. Price: 75s.



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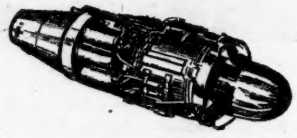

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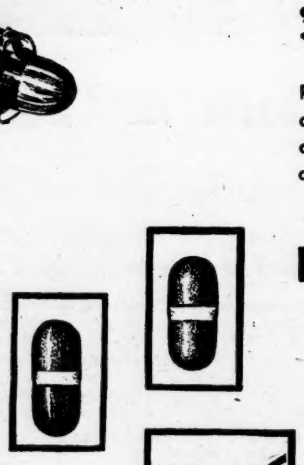

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MEDICAMENTA VERA

The Medical Journal of Australia

SATURDAY, MARCH 20, 1948.

All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given without abbreviation: initials of author, surname of author, full title of article, name of journal, volume, full date (month, day and year), number of the first page of the article. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

PITY.

A SHORT time ago a medical practitioner in Sydney tilted at the daily Press because of publicity given to people with incurable illnesses or conditions for which expensive treatment of uncertain value had been recommended. It was contended that money donated as a result of these public appeals was often wasted and that the principle was not a good one. A leading daily newspaper in an editorial reply made a plea for the value of pity. The printing of a "human interest" story, it was said, "brings thousands of readers in direct mental touch with one instance of the sorrows which exist next door". In response the reader gives or "wastes" money and gains more than is lost in material things. "The gain is in a sudden enrichment of the spirit by pity, and an unselfish and uncalculating desire to help." Pity cannot be wasted, it was asserted; at the least, it has its benefit in those who give it, and the awakening of generous emotions outweighs in absolute value the practical issue of waste of money.

These contentions cannot be lightly put aside. They represent one aspect—and a not unimportant one—of the truth, but they only touch the surface of the understanding of pity. We will not confuse the issue by discussing the suggestion sometimes made that "human interest" stories aim at deliberate exploitation of human misfortunes for their news value alone. The Press writer who is capable of such an attitude is not likely to be impressed by our protests and we shall not insult the decent writer by further reference to the matter. A more relevant question is that of the real nature of the emotions engendered by these Press appeals. The waste of money is not usually significant; the individual amounts contributed are mostly small and, apart from the probably very rare instance of an individual's contributing to the point of hardship to an unworthy cause, the practical act of giving is the best feature of the situation. The disturbing thought is that the emotion aroused may be "*Ersatz* pity", a substitute compound of sentimentality and patronage, the continued encouragement of which will soon cloud the appreciation of true pity. Pity, indeed, cannot be wasted, but emotional force can be dissipated, turned into lesser channels, so that little motive power remains when reason calls for pity's action. It is inescapably true that what is described as "the pleasure of a kindly deed" may dissipate the unpleasant vision of mankind's larger sorrows as efficiently as sweets will dissipate the small child's appetite for dinner. Infinitely worse, of course, is the current prodigal outpouring of emotion in sympathy with screen shadows and unrelated to any action. As an occasional means of relaxation on the one hand or as a genuine stimulus to thought or action on the other, the film is most valuable, but the enervating effect of the film habit on character and personality is no light matter. Sentimentality is stock-in-trade of the film world.

It must be conceded that, if the editorial article referred to goes to one extreme with which we have joined issue, it is seeking to counter another extreme, the cold calculation of what is expedient and practical without any concessions to human feeling. There is a certain parallel, though in a different sphere, to the attitudes of Mary and Martha in the Gospel story, and we should remember that Martha was told that Mary, the unpractical sister, had chosen that good part which should not be taken away from her. The same Mary lavished the costly ointment on her master's feet and was commended despite the protests of the practical-minded Judas. But weighing one extreme against the other we reach the mean. Scrooge classes Christmas and all its sentiment as humbug, and we delight to see him made human. Miranda in "The Tempest" pours out her sorrow over the shipwreck:

> O, I have suffer'd
> With those that I saw suffer! . . . . .
> . . . . . O, the cry did knock
> Against my very heart! poor souls! they perish'd.

And we wait impatiently for Prospero to get a word in edge-wise to tell her that no one was drowned. The examples might be multiplied, but it is sufficient to refer to a few incidents from the constant paradox of Jesus of Nazareth Who was incarnate pity; Who denounced Jerusalem and wept over it; Who consigned the self-righteous and hypocrites to their fate and showed understanding to the publicans and harlots; Who insisted that even family ties must be broken if they interfered with the cause for which He came, and yet in His agony cared first for His mother.

The accusation of being without pity has been made most frequently against the members of the legal and the medical professions. Yet the members of both have most reason and opportunity for learning its true meaning. John Buchan says of Lord Mansfield, "in many ways the most imposing figure in the history of the English bench", that his was:

> a soul self-contained, clear-sighted, dispassionate, and patient . . . his character stands as something polished and complete. But this perfection, if it has few flaws, has its limitations. . . . The chief charge is the expected one of a radical coldness of heart. Here, again, while admitting truth in the accusation, we must protest against the ordinary acceptation of the word. He could be very kind, and he could form the warmest friendships . . . we must confess that he was a little insensible to the warmth of common humanity. . . . It is the old complaint against the entirely rational and clear-sighted man that, in his unbroken march, he misses the wayside virtues which fall to the blind and feeble.

In another place Buchan writes:

> Since a judge is a human being, he must be permitted to have his share in the attributes of mortality. But he must be capable of putting them aside. He must have the power of separating a question from the "turbid mixture of contemporaneousness" with which it is clogged. It is a task which requires supreme intellectual honesty, a complete absence of the "lie in the soul", and it is the first duty of a judge.

In this very impartiality and aloofness lies the judge's real opportunity to show pity.

It has been well said that a doctor must retain an attitude of detachment towards his patients if he is to retain his sanity. To serve their interests best he must be dispassionate and clear in his judgement. He will do what he is able to do and cannot ask himself for more than that. He will handle a human personality with the same gentleness as surgical principles demand for delicate tissues. He will make cold appraisal of the facts, but will never shut up his bowels of compassion from the patient. Perhaps often he will say with Sir William Osler: "If I laugh at any living thing 'tis that I may not weep." For the rest, Dr. John Brown gave us the best definition of pity nearly a century ago when he spoke of the eager young students dashing in to see the day's operations.

> Don't think them heartless; they are neither better nor worse than you or I: they get over their professional horrors and into their proper work; and in them pity—as an *emotion*, ending in itself or at best in tears and a long-drawn breath, lessens, while pity as a *motive*, is quickened, and gains power and purpose. It is well for poor human nature that it is so.

Current Comment.

PROGNOSIS IN HYPERTENSION AND ASSOCIATED CONDITIONS.

THE assessment of prognosis in cases of hypertension and associated conditions is often a difficult problem. Considerable difference of opinion occurs during mass examinations, as, for example, that of service recruits, especially regarding the significance of transient hypertension; in this case, of course, the problem relates in the main to the prognosis in the immediate or near future, but a longer term assessment is needed for civilian patients or for such as recruits to a permanent army. A valuable statistical analysis of the medical records of 22,741 army officers has been made in the United States by R. L. Levy, P. D. White, W. D. Stroud and C. C. Hillman, and they consider that the facts obtained probably hold true for the general male population of comparable physical fitness and similar age groups. In a series of papers over the past four years they have discussed their findings in regard to the prognostic significance of transient hypertension, transient tachycardia and overweight. Their latest paper[1] is intended to integrate the earlier reports. A great deal of statistical data is presented in summary form, but it should be sufficient to quote their main conclusions. They appear to have established clearly that the presence of transient hypertension or of transient tachycardia or of overweight, each by itself, increases the probability of the later development of sustained hypertension and of retirement or of death with cardio-vascular and renal disease. The presence of two of these conditions is of greater importance, in these respects, than that of any one alone. The presence of all three is a circumstance of major prognostic importance. By sustained hypertension is meant a reading of over 150 millimetres of mercury (systolic) or of 90 millimetres (diastolic), persisting throughout one examination and not followed in subsequent examinations by levels lower than these. Transient hypertension is taken to mean a reading above these same levels, which is followed on any particular examination or at a later examination by a reading below these levels. By transient tachycardia is meant a heart rate of 100 per minute or over, of sinus origin, which is followed after rest on any particular examination by a rate under 100 per minute. An officer is considered to be overweight if he is heavier, by 20 pounds or more, than the standard given in Army Regulations; these standards were calculated according to weight and age. With respect to the later development of sustained hypertension, slight degrees of elevation are important, even when the systolic level alone is involved; of the greatest prognostic significance, however, is a transient rise in diastolic pressure above 100 millimetres of mercury.

Information as to the outcome in the case of those who developed sustained hypertension is necessarily limited, as no records were available for any officer after his retirement. However, such information as is known is of interest. As would be expected, in the majority of cases of those with sustained hypertension who were retired or who died, the retirement or death was due to cardio-vascular and renal disease. The leading causes of retirement because of cardio-vascular and renal disease were hypertension itself, coronary heart disease and cerebral arteriosclerosis, including hæmorrhage and thrombosis. Coronary heart disease and cerebral hæmorrhage together were responsible for 66% of the deaths from cardio-vascular and renal conditions during the period of observation.

The comments of these investigators are brief, but indicate the importance which they attach to their findings. They consider that when standards are being revised for the selection of those physically qualified for military service, factors predisposing to the later development of sustained hypertension and cardio-vascular and renal disease should be taken into account. When dispositions are being made of men in whom sustained hypertension develops while they are in service, consideration should be given to the high incidence and disabling nature of the circulatory and renal complications associated with this condition.

As with most statistical analyses, the conclusions are necessarily generalizations and do not provide a ready-made answer in any particular case, but the findings, which apply equally well to civilians as to army officers, provide a valuable background of information against which the individual patient's clinical condition may be assessed.

[1] *The Journal of the American Medical Association*, September 13, 1947.

SENSITIVITY TO PENICILLIN.

EARLIER reports on penicillin were notable for the absence of, or lack of prominence given to, sensitivity reactions associated with its administration. An impression was widely held that penicillin was an inert substance, although careful observers (such as Officer, Loewenthal and Perry in this journal on November 4, 1944) recorded unexplained side reactions; the drug was administered without hesitation if it appeared likely to be of any therapeutic value. More recently, for whatever reason, reports of sensitivity reactions have become more frequent. A study of various types of cutaneous reactions to penicillin has been made by H. J. Templeton, C. J. Lunsford and H. V. Allington,[1] who state that sensitivity to the drug has developed as the result of topical application, of oral ingestion and of parenteral injection. Sensitivity associated with topical application occurs amongst doctors, chemists and others who handle the drug as well as amongst patients. It is pointed out that as penicillin in the strengths usually applied therapeutically is not a primary cutaneous irritant, it should not produce contact dermatitis when applied to skin which has not been sensitized by previous application of penicillin or by some other fungus. It is thought that at least some

[1] *Archives of Dermatology and Syphilology*, September, 1947.

individuals, who display penicillin sensitivity at their first contact with the drug, have been sensitized by some previous fungous infection. Cheilitis, stomatitis, glossitis and conjunctivitis also occur following the appropriate topical application. The commonest type of dermal reaction following the systemic use of penicillin is urticaria; this usually occurs on the seventh, eighth or ninth day after the injection of the drug and varies from a mild form to one of such severity that a patient being treated by Templeton and his colleagues threatened to commit suicide. Various other dermal types of reaction occur including macular or scarlatiniform eruptions during the first few days after injection, and "phytid" types of reaction which are presumably, though not certainly, the result of a previous condition of dermatophytosis. It has also been observed that, when sensitivity has been developed as a result of topical application, the subsequent oral ingestion or parenteral injection of penicillin may be followed by an outbreak of the original local skin reaction in addition to a generalized dermal reaction such as urticaria.

Templeton and his colleagues consider that patients whose skins are in unstable equilibrium because of exudative dermatoses are "poor risks" with penicillin either topically applied or injected; the drug should not be given to patients with eczema or eczematoid dermatitis unless there is a clear-cut indication for its use, such as superimposed pyogenic infection which has not yielded to older conservative therapy. It is permissible to use penicillin topically in simple pyoderma or in impetigo, as it usually effects cures in these diseases within a week, during which it is unlikely that sensitization will have time to develop. Apart from the avoidance of precipitating circumstances, there is some evidence that reactions may be prevented by changing the brand of penicillin or the vehicle of administration, but this has not been the experience of most investigators. The newer antihistamine drugs such as "Benadryl" are sometimes helpful in preventing or alleviating urticarial reactions.

A lengthy discussion followed the presentation of the paper, and it was evident that untoward reactions to penicillin were well known. Mention was made of the occurrence of generalized exfoliative dermatitis with a fatal outcome and of œdema of the glottis for which tracheotomy was required. Several of the speakers were of the opinion that penicillin should not be used topically, and in his remarks in reply Templeton was inclined to agree with them. He said, however, that he had left a loophole in his paper because of the excellent results and convenient nature of its use in the treatment of impetigo. This has been the general experience, and it would be a pity to lose this valuable form of therapy. Nevertheless, the general warning should be heeded. Fortunately there appears to be a good deal of support for the statements by W. B. Sherman,[1] of the Roosevelt Hospital in New York, that allergic reactions to penicillin frequently subside while the administration of the drug is continued, and that patients showing allergic symptoms from penicillin often tolerate a subsequent course within a few weeks or months without reaction. This is reassuring to some degree, but applies only to certain patients. There are good grounds for urging that the reliable indications for the use of penicillin should be learnt and adhered to.

MORTALITY FROM ACUTE APPENDICITIS.

ALTHOUGH acute appendicitis can present a very worrying diagnostic or therapeutic problem, there is a temptation to regard the condition as commonplace and to neglect its overall significance. Some interesting data have been compiled by Rudolph N. Schullinger[2] relating to the mortality from acute appendicitis at Presbyterian Hospital, New York, and compared with information from other parts of the United States. During the thirty-year period from 1916 to 1946, there were 5405 cases of acute appendicitis at Presbyterian Hospital, in 193 of which the patient died, a total death rate of 3·55%. This figure compares favourably with the results in 20 other hospitals amongst which the mortality rate ranged from 1·6% to 5·97% with the majority between 2·5% and 4·5%. The annual death rate fluctuated widely, but there was a downward trend seen most clearly in a progressive five-year average curve; the rate in the last five-year period was 1·37%. The details are then analysed according to certain clinical groupings. Amongst those with simple acute appendicitis (2855 cases), the mortality has never been high and in many years has been nil; the progressive five-year average curve was fairly uniform with a slight downward trend. The least satisfactory results related to acute appendicitis with acute local peritonitis; there were 26 deaths in the 1262 recorded cases (2·06%—four times the rate for simple acute appendicitis); there was a steady decline in the progressive five-year average from the 1916-1921 to the 1929-1934 period, but since then the curve has had an upward trend. In 896 cases of acute appendicitis with primary appendiceal abscess, there were 81 deaths (9·04%), but the progressive five-year average has declined steadily to a mortality of 4·16% in the last five-year period. Acute appendicitis with acute diffuse peritonitis occurred in 452 cases with 70 deaths (15·48%); during the first twenty years the mortality rate was high, but it has fallen off strikingly in the past nine years, being only 4·08% in the 1941-1946 period. There were only 34 cases of acute appendicitis with acute progressive fibrinopurulent peritonitis and 28 of the subjects died; only one survived of five patients affected in the last five-year period.

Schullinger discusses these findings at length, but the factors concerned are too numerous and diverse to be summarized. He points out that the general reduction in mortality is in keeping with a nationwide reduction, particularly since 1930. Education of the public, improved public health facilities, better medical training, especially of resident medical officers, and advances in treatment have all played a part. It is noticeable that in the last five-year period there were proportionately fewer fatalities from intraperitoneal infections and complications, and relatively more from cardio-vascular and other "non-surgical" conditions; it should be appreciated that these are relative changes, the reduction in the number of "surgical" complications throwing into prominence the approximately static incidence of "non-surgical" conditions. In the group for which concern was expressed, that associated with acute local peritonitis, Schullinger considers that the recent increase in mortality was associated with misjudgement of the seriousness of the pathological conditions, and with errors of operational technique and judgement, especially in relation to drainage; he sets out in detail his views and recommendations concerning drainage, as well as a series of suggestions likely further to improve the overall results.

It would be of interest to examine Australian results grouped in such a way that they could be compared directly with Schullinger's figures. The only recent results presented were in Starr's paper in this journal on January 20, 1940; in 1418 cases of appendicectomy performed during the previous ten years, there were only nine deaths, giving a mortality rate of 0·7%. This is remarkably low, though the figures are not comparable in detail with the American data because of differences in classification. In view of the changes that have taken place in the past fifteen or so years (changes reflected in Schullinger's results) it would be of value to have brought up to date results such as those recorded at the Melbourne Hospital presented by Newton[1] in 1931 (mortality rate 5·2%), those at the Alfred Hospital, Melbourne, presented by Brown in this journal on September 29, 1934 (mortality rate 3·9%), those at Geelong Hospital presented by Ross on February 9, 1935 (mortality rate 1·8%), or those at the Royal Prince Alfred Hospital, Sydney, presented by Storey on May 25, 1935. (In the last case chronic conditions were included and it would be desirable to have these grouped separately.)

[1] *The American Journal of Medicine*, November, 1947.
[2] *Annals of Surgery*, October, 1947.

[1] *The Australian and New Zealand Journal of Surgery*, December, 1931.

Abstracts from Medical Literature.

SURGERY.

Fractured Ribs Treated by Nerve Blocking.

D. J. RICHARDSON AND E. M. PAPPER (*The Journal of Thoracic Surgery*, August, 1947) have made a survey of 217 patients with fractured ribs treated with nerve blocking, either paravertebral or intercostal. More than 80% of the patients derived almost immediate relief of pain after the initial injection. Less than 25% required more than one treatment. The authors believe that the relief of pain by nerve blocking is of significant value in preventing pulmonary infections and death of patients with fractured ribs.

Œsophageal Duplications or Mediastinal Cysts of Enteric Origin.

JOHN C. JONES (*The Western Journal of Surgery, Obstetrics and Gynecology*, November, 1947) describes the histology, embryology, symptomatology, diagnosis and treatment of œsophageal duplications or mediastinal cysts of enteric origin. He reports two more cases, one in a child aged two months and the other in a child aged nineteen months. Both were undiagnosed until the tumour was examined microscopically; one patient had no symptoms and the other only very mild symptoms referable to the cystic mediastinal tumour. The first patient died of pneumonia, no operation having been done, and the second patient was cured by surgical excision of the abnormality.

Familial Polyposis of the Colon.

PLIMPTON GUPTILL (*Surgery*, August, 1947) discusses familial polyposis of the colon with special reference to the tendency towards malignant degeneration and to the problem of treatment. Five cases of polyposis are reported, four of the patients being members of the same family. The direct factor causing the proliferative tendency in the colonic epithelium is unknown, but it behaves as a Mendelian recessive. The diagnosis of polyposis is made from the history, digital examination of the rectum, proctoscopic examination and X-ray examination of the colon. The last investigation is the most important, and the contrast barium and air replacement enema is recommended. When palpated at operation the colon is rather soft, does not collapse on pressure and feels heavy. Areas of malignancy can be recognized by constriction, scarring or induration. Malignant degeneration is an intrinsic characteristic of polyposis of the bowel. The author quotes various series of collected cases in which over one-third of the subjects developed cancer, and cites views that in 100% eventually malignancy occurs. Of the five cases reported by the author, carcinoma supervened in four, and in two of these it was multiple. The only conservative method of treatment of multiple polyposis is irradiation, but the author regards this as illogical in view of the well differentiated cells of the polypi. Various operative measures have been tried. In selected cases the removal of polypi through multiple colostomies has been carried out, but it would seem impossible in this way adequately to destroy all the polypi in a true case of familial polyposis, while the subsequent closure of the colostomies denies to the surgeon the opportunity of inspecting the mucosa for recurrence. Opinion has gradually come to favour a radical removal of the polypoidal area, and the author considers that all polypus-bearing mucosa must be removed, and that any segment of rectum left to retain sphincter function must be so short as to be readily accessible to direct vision and easy fulguration. The preservation of any portion of rectum can be made with wisdom only when the initial polypi in this area are unquestionably benign. The author concludes that the procedure of choice is fulguration of the polypi in the lower rectum and anastomosis of ileum to rectum, followed by a two-stage colectomy and close observation.

Excision of Knee Joint for Suppurative Arthritis.

JAMES E. THOMPSON, CHARLES F. STEWART AND WILLIAM H. CASSEBAUM (*Surgery, Gynecology and Obstetrics*, December, 1947) discuss the management of suppurative arthritis of the knee joint with special reference to excision of the joint. This method has been employed by French surgeons since the first world war, but the authors confess that their first reaction when it was recommended to them was one of violent opposition. The procedure accepts the fact that suppurative arthritis in the knee results in a permanently damaged joint which is either ankylosed or possesses some degree of painful motion. Excision of the joint shortens the course of sepsis by removing feebly resistant cartilage and the areas of infected bone and synovia. Life and limb are saved by diminishing this phase of infection, during which the patient becomes very toxæmic and depleted. Five patients with suppurative arthritis were submitted to arthrectomy during an active stage of infection. In none was there any local flare-up or sign of increased sepsis. Nothing occurred to suggest that intervention had broken down any defensive wall the body had built up. The authors are careful, however, to point out that in each of these patients arthritis followed damage to the joint, and the possibility exists that the joint of hæmatogenous arthritis, where bacteria invade healthy tissues, may react differently. Thompson and his associates believe that the resection of joints during suppuration has a definite place in surgery, but hope that penicillin and careful surgical measures will make that place a small one. If, despite drainage, immobilization, transfusion and adequate chemotherapy, suppuration persists and destructive bone changes become visible in the X-ray film, resection should be recommended.

A Technique for Portacaval Anastomosis.

C. STUART WELCH (*Surgery, Gynecology and Obstetrics*, October, 1947) reports a case of portal hypertension caused by intrahepatic portal bed block treated by portacaval anastomosis. The technique used is described. An end-to-side anastomosis of the portal vein to the inferior *vena cava* was performed above the renal veins. A clamp (Thomas Smith intestinal clamp) with spring blades is used and applied to the inferior *vena cava* in such a way that a free flow of caval blood can pass beneath the clamp which has temporarily isolated a portion of the wide cava. For emergency use, loops of umbilical tape are placed above and below the clamp. The everting suture of Bialock was employed in a medial and lateral row.

Section of the Vagus Nerves in Treatment of Peptic Ulcer.

LESTER R. DRAGSTEDT, PAUL V. HARPER, JUNIOR, E. BRUCE TOVEE AND EDWARD R. WOODWARD (*Annals of Surgery*, November, 1947) discuss their experience with 212 patients suffering from various types of peptic ulcer on whom division or resection of the vagus nerves was employed as a method of treatment. Their study extended over four years. They indicate a preference for a transabdominal approach with its significant advantage of making possible inspection and palpation of the lesion and the performance of gastro-enterostomy in the presence of cicatricial obstruction at the pylorus. The clinical results of operation in their series have been excellent, and they state that a benign peptic ulcer may be regularly expected to heal if all vagus fibres to the stomach are divided. There has been no evidence of regeneration of secretory fibres in the vagus nerve even in patients operated upon four years ago. Complications and undesirable sequelæ encountered are intercostal pain, pleural effusion, atelectasis, delayed emptying of the stomach and diarrhœa. These were for the most part mild and self-limiting, and their incidence and severity were reduced by careful post-operative care. The most important item in post-operative care is the guarding against distension of the stomach during the immediate post-operative period by maintaining gastric decompression by means of a Levine tube and Wangensteen suction apparatus for a period of five days following vagus section. After this period the patient is given small amounts of water, and at the end of twelve hours the stomach is aspirated to determine if retention has occurred. If the stomach is not emptied decompression is instituted and maintained for another twenty-four hours to forty-eight hours, and only when the stomach empties itself satisfactorily of liquid contents is solid food permitted. The authors contend that poor results of other workers are due to the incomplete division of vagus nerve fibres, and stress the importance of repeated physiological tests to determine residual innervation of the gastric glands.

WALTMAN WALTERS, HAROLD A. NEIBLING, WILLIAM F. BRADLEY, JOHN T. SMALL AND JAMES W. WILSON (*Annals of Surgery*, November, 1947) report their study of the problem of section of the vagus nerves or, as they call it, "gastric neurectomy" from the anatomical, physiological and chemical standpoints. They found that in 92% of 92 adult autopsy subjects the vagus nerves could be isolated and successfully divided near the diaphragm. They advocate the transabdominal approach because it permits, in addition to adequate vagus section, exploration of the contents of the abdomen, examination of the ulcer and its removal if thought to be advisable, and the performance of a gastric drainage operation such as gastro-enterostomy. In

only 14 out of 40 patients could they perform vagal section without some other surgical procedure on the stomach in order to prevent serious post-operative gastric retention, and even among these fourteen there were four who had worrying disturbance of motility with gastric retention. Of the fourteen patients one died suddenly one hour after operation; in the other thirteen satisfactory results were obtained as measured by relief of pain, reduction of acidity and general reduction of secretions. Of those patients subjected to gastric neurectomy with other gastric operations, fifteen were treated for duodenal ulcer, three for gastric ulcer and five for gastro-jejunal ulcer. The immediate results among the patients with gastro-jejunal ulcer were very satisfactory. However, their overall results lead them to state that reduction in acidity, although occurring in most cases, was inconstant in others; the disturbances of motility of the stomach and intestines were of frequent occurrence after operation and caused trouble to the patients which in some cases was prolonged and persistent. The greatest field of usefulness for gastric neurectomy seems to be in the treatment of ulcer after partial gastrectomy and in certain cases of non-obstructive duodenal ulcer in which the cephalic phase of gastric secretion is marked and pain is intractable. The authors' final conclusion is that, for the time being, the operation of gastric neurectomy must be considered to be in the investigation stage and the effects of operation carefully studied.

Carcinoma of the Stomach.

DAVID STATE, GEORGE MOORE AND OWEN WANGENSTEEN (*The Journal of the American Medical Association*, October 4, 1947) have surveyed the early and late results of the surgical treatment of carcinoma of the stomach at the University of Minnesota Hospitals for a ten-year period (1936-1945 inclusive). They found that a total number of 586 patients with gastric carcinoma were seen during that period, 432 being men and 154 women, with an average age of 63·2 years. Of the total seen 447 were operated on, an operability rate of 76·3%. Of those subjected to operation 307 patients were submitted to gastric resection, a resectability rate of 52·2% of the total number of patients, but 68% of those subjected to laparotomy. Gastric resection resulted in a mortality rate of 16·6%, there being a mortality of 15·2% among those submitted to partial gastrectomy and 30% among those submitted to total gastrectomy. Exploratory laparotomy resulted in a mortality rate of 8·2%, gastro-enterostomy 24% and enterostomy 13·4%. As to the cause of post-operative mortality after gastrectomy, post-mortem examination was carried out after 44 of 51 deaths, the major cause of death being peritonitis which accounted for 28 fatalities. The authors maintain that the closed method of resection which was begun in the clinic in 1938, but was not adopted by all members of the surgical staff until 1940, has considerably reduced the incidence of peritonitis. With reference to three-year and five-year cures, the authors found that in 10·7% of the total number of cases three-year cures were obtained, but based on the number of patients subjected to resection the percentage of three-year cures reached 29·4, while based on the total number of patients seen the five-year cure rate was 6·6%; based on the number who survived resection it became 21·5%. The results of palliative operations for carcinoma of the stomach showed the average length of survival after gastro-jejunostomy to be 5·4 months and after enterostomy 3·5 months, while palliative gastric resection in patients in whom the extent of the lesion precluded any idea of cure gave the surprising length of survival of 22·4 months. Palliative resection carried out in the presence of metastases resulted in an average of fifteen months' survival. From the above data the authors reached the following conclusions: (i) Gastric resection remains the only mode of treatment capable of curing carcinoma of the stomach. (ii) Gastric resection is the only palliative procedure of value. (iii) In spite of increasing operability rate and resectability rate and a decreasing mortality rate, the total number of patients cured remains small. (iv) In order to increase appreciably the number of patients cured it is mandatory that the diagnosis be made at an earlier period than it is being made now.

Indications for Simple Mastectomy.

DANELY P. SLAUGHTER AND LAWRENCE W. PETERSON (*Surgery, Gynecology and Obstetrics*, October, 1947) review records of 71 cases in which simple mastectomy was performed and conclude that in only 21 was the procedure justified. They consider that the operation of simple mastectomy is performed far too frequently for benign breast lesions. They believe that the procedure should be performed only on the basis of a carefully defined diagnosis. Simple amputation of a breast should not be carried out on suspicion or just in case of doubt. The indications for simple mastectomy are grouped as therapeutic and prophylactic. Therapeutic indications exist when a diagnosed disease of the breast is being treated, such as advanced inoperable breast cancer with a bulky ulcerating mass; cancer in "poor risk" patients as a palliative measure; sarcoma of the breast; chronic suppurative infections, either non-specific or tuberculous, which have destroyed much breast tissue; the rare instance of uncontrollable and severe mastodynia which does not respond to endocrine therapy and which requires opiates for relief; and the equally rare diffuse fat necrosis through the breast with sinus formation. Prophylactic indications exist in the presence of multiple tumours with malignant potentialities, such as multiple intracystic papillomata, *cystosarcoma phyllodes* and precancerous chronic cystic mastitis with diffuse duct changes of advanced atypical epithelial hyperplasia.

Experiences with Streptomycin in Infections of Intestinal Origin.

HENRY L. SILVANI *et alii* (*Surgery, Gynecology and Obstetrics*, December, 1947) review their experiences with streptomycin in the treatment of infections of intestinal origin, first in a group of thirteen patients with serious intraabdominal infections, and secondly in a series of laboratory animals in which intraperitoneal infection had been induced experimentally. Six of the patients had intraabdominal abscesses, five diffuse acute peritonitis, one acute cholangitis, and one an abscess of the liver. Streptomycin was given by intramuscular injection at three-hourly intervals. Dosages ranged from 15 to 52 grammes *in toto*. No other chemotherapy was given, except to two patients who received penicillin concurrently with the streptomycin, but general supportive measures and surgical intervention were carried out as indicated. In the laboratory animals an acute diffuse peritonitis was induced by crushing the appendix and ligating its base, at the same time removing the spleen and the greater omentum. In the group of thirteen patients the streptomycin therapy was believed to have been probably beneficial in one, possibly beneficial in one, doubtful but possibly helpful in two, of doubtful value in five, and of no value in four cases. In the laboratory animals local and systemic streptomycin therapy in the dosages used apparently prolonged the survival times of the animals, but did not significantly alter the bacterial flora or save the lives of the animals.

Indications for Thyreoidectomy in the Treatment of Hyperthyreoidism.

GEORGE CRILE, JUNIOR (*The Western Journal of Surgery, Obstetrics and Gynecology*, November, 1947), has treated 218 subjects of hyperthyreoidism with propylthiouracil during the past year. There was one death, but this was probably not related to the use of the drug. One serious complication, exfoliative dermatitis, occurred, but the patient recovered. Minor side reactions occurred in less than 3% of cases. A dosage of 200 to 300 milligrammes daily was used and the author concludes that this appeared to be less than the effective dose and in some instances did not effect and maintain a remission. Time does not, as yet, permit a statement of the percentage of patients in which long-standing remissions will occur. The author advises that, if the patient is intelligent and cooperative and can be observed by a physician who is familiar with the physiology of the thyreoid and the pharmacology of the drugs, treatment can be carried out safely and effectively over long periods of time. However, if the patient is ignorant or uncooperative or cannot be observed periodically, it is preferable to prepare the patient for and perform thyreoidectomy. Patients with small or moderate-sized diffuse goitres and mild or moderate hyperthyreoidism, patients with recurrent hyperthyreoidism and patients in whom expectancy of life is short, regardless of the type of goitre, may, with safety, be given a trial on medical management for a year or more. If the response is favourable, this may be continued indefinitely. If they respond poorly or desire surgery, a suitable type of thyreoidectomy should be performed.

The Action of Heparin on Experimental Venous Thrombosis.

LEO LOEWE, EDWARD HUSCH AND DAVID GRAYZEL (*Surgery*, November, 1947) report a series of experiments carried out to determine the action of heparin on experimental venous thrombosis. Their results show that in addition to heparin's being of use as a protection against intravascular clotting, heparin therapy in experimental venous thrombosis in rabbits results in the complete resolution of early clots, great enhancement of growth of the collateral venous circulation, and acceleration of the speed of recanalization after occlusive thrombus formation.

Medical Societies.

MELBOURNE PÆDIATRIC SOCIETY.

A MEETING of the Melbourne Pædiatric Society was held on June 11, 1947, at the Children's Hospital, Melbourne, the Acting Chairman, DR. H. BOYD GRAHAM, in the chair.

Spontaneous Mediastinal Emphysema.

DR. V. L. COLLINS read a paper entitled "Mediastinal Emphysema" and showed a patient suffering from the condition. This paper will be published in a later issue of the journal.

New Diagnostic Test of Cerebro-Spinal Fluid in Influenzal Type B Meningitis.

MR. M. F. WARBURTON, of the Commonwealth Serum Laboratories, said that the test for the diagnosis of cerebro-spinal meningitis due to *Hæmophilus influenzæ*, type B, was based on the fact that the bacillus produced in broth culture a substance which was adsorbed to the surface of red blood corpuscles. Red cells coated with this substance were agglutinated by rabbit antiserum containing the specific antibodies for the organism—the serum used for treatment of the disease. This phenomenon was noted by Dr. Edgar North, of the Commonwealth Serum Laboratories, and it had occurred to Mr. Warburton that it could be adapted for use as a diagnostic test. A specimen of cerebro-spinal fluid from a patient suffering from severe untreated influenzal meningitis was kindly supplied by Dr. Reginald Webster. Red blood corpuscles added to this specimen, washed and resuspended in saline solution, were agglutinated by influenzal serum, as had been anticipated, whereas red cells similarly treated in control specimens of cerebro-spinal fluid from patients with meningitis due to other agents were not agglutinated. However, some further specimens of cerebro-spinal fluid obtained from patients with untreated influenzal meningitis gave negative results when tested by this method. The explanation of the failure was found in another observation of Dr. North, who noted that broth cultures of the organism were highly active when used immediately after incubation to sensitize red blood corpuscles, but that the cultures lost this property if allowed to remain in the incubator after maximum growth of the organism had occurred. Further investigation of this phenomenon showed that the substance which was adsorbed to red blood corpuscles was a compound of the specific carbohydrate with a protein carrier. The protein carrier attached itself to the red cell surface, while the carbohydrate portion of the molecule united with the specific antibody. Both broth and cerebro-spinal fluid became inactive because of the presence in them of any enzyme which modified the protein "carrier" so that it no longer attached itself to the red cell surface. However, the carbohydrate portion was still able to react with the specific antibody. The specific carbohydrate therefore was capable of removing from anti-influenzal serum the specific antibody which agglutinated red blood cells treated with the intact substance, and it was on this fact that the test now developed was based.

Mr. Warburton went on to say that red cells (human or fowl) were sensitized with the supernatant fluid of a broth culture of *Hæmophilus influenzæ*, to which 0·5% formalin solution had been added. Next, the dilution of antiserum which would agglutinate these treated cells was determined. The serum used at the Commonwealth Serum Laboratories would agglutinate these treated red cells if diluted to 1 in 640 with saline solution, but not if diluted to 1 in 1280. If the dilution of serum was made in cerebro-spinal fluid from a patient with influenzal meningitis instead of in saline solution, the specific antibody would combine with the free polysaccharide in the cerebro-spinal fluid, and the power of the serum to agglutinate the sensitized red cells would be reduced, the titre falling from 1 in 640 to 1 in 320 or less. The extent of the reduction in titre was a measure of the polysaccharide content of the cerebro-spinal fluid under test. A negative result indicated either that the patient's infection was not due to *Hæmophilus influenzæ*, or that he had responded to treatment.

DR. E. V. KEOGH, of the Commonwealth Serum Laboratories, said that the hæmagglutination test devised by Mr. M. F. Warburton and Dr. Edgar North had advantages over the precipitin method commonly used for detection of specific polysaccharide in cerebro-spinal fluid. First, it was much easier to read than was the precipitin reaction, particularly when the concentration of polysaccharide was low. The new test was therefore more sensitive. Secondly, it made possible a rapid quantitative determination of the amount of polysaccharide in a specimen. The more severe the infection, the greater the concentration of polysaccharide in the cerebro-spinal fluid, and conversely, as the patient responded to treatment, the polysaccharide content rapidly diminished. This test therefore facilitated a rapid diagnosis of the infection, and permitted the immediate use of specific treatment for influenzal meningitis—rabbit antiserum and streptomycin. The doses of these agents could be assessed according to the intensity of the infection, or, in line with the present discussion, according to the amount of polysaccharide found in the cerebro-spinal fluid, and response to treatment could be followed in the same way.

DR. J. W. GRIEVE said that the test opened up a considerable field and would be a help in establishing the diagnosis, as well as in assessing the prognosis. The present tendency in the case of babies with purulent meningitis when organisms could not be detected was to regard the infections as influenzal rather than as meningococcal. The test would be a tremendous help clinically in elucidating such cases.

DR. STANLEY WILLIAMS said that he had seen the men at work perfecting the test, but had not understood it fully till the meeting. Dr. Keogh was the power behind the tremendous work involved, and all should be grateful to him. The test had demonstrated its usefulness already, more on the negative side. One or two cases had appeared in which organisms could not be isolated, and the test had given negative results. Justification was therefore felt for withholding serum and streptomycin. The test enabled a decision to be reached early and the correct treatment of influenzal meningitis instituted with streptomycin and rabbit's antiserum. The routine procedure at the present time was the performance of lumbar puncture, and if turbid fluid was found, the administration of 20,000 units of penicillin intrathecally; this therapy was maintained by three-hourly intramuscular injections. Later, when the organism was definitely known, antiserum was given, and in a few instances streptomycin. It was also possible to give antiserum and streptomycin within a short time of the first lumbar puncture. This should have far-reaching effects.

DR. ROBERT SOUTHBY thanked Mr. Warburton and Dr. Keogh for their contributions. He said that the test helped in early diagnosis, and so was a big advance. In the last two years there had been an apparent increase in the incidence of influenzal meningitis, and physicians had been encouraged to regard doubtful cases as of this nature. This test should give a clearer conception at an earlier time. Dr. Southby was interested to hear that if the test was performed quantitatively, it could be decided how much antiserum to administer in a particular case. It was now the custom to give 120 millilitres to all babies, irrespective of weight. The test was also a help in the decision when to start and when to diminish specific therapy. Dr. Southby asked advice about an influenzal meningitis infection in a baby who, after treatment with penicillin, streptomycin and antiserum, appeared to make a good recovery, but relapsed. With more antiserum (given with some misgiving) and streptomycin, he again recovered, though left with a hemiplegia. The cerebro-spinal fluid at this stage was free from cells and organisms. The child was discharged from hospital, but had to be readmitted one month later, desperately ill. The cerebro-spinal fluid was then purulent and contained *Hæmophilus influenzæ*. Dr. Southby said he felt that if anything was going to do any good, it was more antiserum; but an anaphylactic reaction was feared. However, he took a chance, and administered the serum under anæsthesia. The baby weathered this, but died about thirty-six hours later. Dr. Southby wondered whether the test might have revealed a localized collection in the meninges in the intermediate phases when the baby looked and seemed so well.

DR. H. MCLORINAN asked if there was any possibility of using the test to determine the presence of *Hæmophilus influenzæ* infection in other parts of the body, especially in laryngitis. This was an acute infection, and quick diagnosis and treatment were imperative.

DR. ELIZABETH TURNER asked whether the test had any advantage over Hatty Alexander's cerebro-spinal fluid sugar table. If the sugar content of the cerebro-spinal fluid was less than ten milligrammes *per centum*, 120 millilitres of antiserum were advised; if the sugar content was higher, the dose of antiserum was reduced. Hatty Alexander had also mentioned the microscopic examination of the organism for capsular swelling as a test of some value in this respect.

Dr. Keogh, in reply, said that Dr. Southby had raised a difficult point. He could not be sure what the test would reveal in the circumstances quoted. In influenzal meningitis a liability existed to superadded infection and cerebral abscess formation. Dr. Keogh did not know whether serum

would deal with loculated areas of infection. Dr. Keogh said the test would probably not be helpful in Dr. McLorinan's cases of laryngitis. The diagnosis had to be made on clinical grounds in these cases. In answer to Dr. Turner, Dr. Keogh said that it would be unwise to abandon estimation of the reducing substance in the cerebro-spinal fluid. The new test was simple to perform for the laboratory technician. It was reasonable to think that the two tests would be correlated. In the presence of severe infection probably there was a lot of polysaccharide and a low glucose content in the cerebro-spinal fluid. The new test was also less difficult for the laboratory men to perform than the capsular swelling test. Concerning the use of the test with the various strains of *Hæmophilus influenzæ*, Dr. Keogh said that this particular test would work only with type B. However, there would be no difficulty in modifying it to make it work with other strains, though the matter became cumbersome. Indeed, the test could be modified for use in meningococcal infections; but there existed such a wide variety of strains that to exclude them all and define the exact type of infection became too complicated and really impracticable. However, it would work with other types; the protein portion was common to all infections, but the polysaccharide varied with each strain. The test was a pretty one, but it would not revolutionize treatment.

Influenzal Meningitis.

DR. ELIZABETH TURNER showed a female child, aged three years, who had been successfully treated for influenzal meningitis. The child was the subject of a case report in THE MEDICAL JOURNAL OF AUSTRALIA of February 15, 1947, at page 205.

DR. STANLEY WILLIAMS said that much had been learnt from Dr. Turner on the treatment of influenzal meningitis, and everyone was familiar with her excellent results. She was to be congratulated on bringing this child's illness to a successful conclusion. It was impossible to imagine that any other form of therapy could have achieved better results. Dr. Turner was well alive to the possibility of abscess formation. The final result was justification for the treatment used.

DR. E. V. KEOGH said that it was difficult to see how immediate improvement could follow penicillin therapy if the condition was a cerebral abscess. Dr. Robertson did not think a cerebral abscess had developed. Dr. Keogh said he wondered whether the infecting agent was an *Hæmophilus influenzæ* type B. He went on to say that when rabbit's antiserum was given, it was hoped that some would pass through to the cerebro-spinal fluid. It was probable that some did pass through. It was not possible to give serum intrathecally, but penicillin could be administered in this fashion. The child would probably have responded very well to streptomycin.

DR. DUDLEY HAGGAR said that an important point about the case was the demonstration that when 20,000 units were ineffective when given intrathecally, a response might be obtained to 50,000 or 100,000 units. Dr. Turner had given 100,000 units in one millilitre of saline solution. A solution of 100,000 units in water was hypertonic. Dr. Haggar asked what concentration in water would produce a solution isotonic with cerebro-spinal fluid and muscle tissue. It was noted that after penicillin therapy the cell count in the fluid rose to 1000 per cubic millimetre. It was the practice to give penicillin in cases of meningitis until the cell count was approximately normal. It was possible that these patients were being overtreated. Before the advent of penicillin meningococcal meningitis responded more quickly with a rapid reduction in cell count. An attempt should be made to determine the influence of therapy on cell count.

DR. GUY SPRINGTHORPE said that he had encountered a similar case at the Alfred Hospital. The child had been treated at a country hospital for meningitis, but had not had serum or penicillin. He was admitted to the Alfred Hospital in a comatose condition and with hemiplegia. He responded well to penicillin therapy, and the hemiplegia was gradually diminishing. Dr. Springthorpe asked what was the indication for repeated doses of antiserum, and how frequently they were to be given. At first it had been advised that only a single dose of 120 millilitres was desirable. Dr. Springthorpe said that a two-year-old baby was given serum at the Alfred Hospital, and the child quickly developed an anaphylactic reaction and almost died. With the aid of adrenaline the child survived. Dr. Springthorpe said that he had been asked whether desensitization should be attempted. With great daring this was done, and serum was given without further reaction. The child had not had serum previously. It was interesting to discover that therapy could be continued with the aid of desensitization.

DR. ROBERT SOUTHBY offered his congratulations to Dr. Turner. He said that the case emphasized the efficacy of large doses of penicillin. The initial dose of serum held the infection, and the various doses of penicillin swung the balance immediately, as could be seen from the temperature, the cell count, and the sugar content of the fluid, and from the clinical state of the patient. Dr. Springthorpe had raised the question of repeated doses, and in this respect, Dr. Southby quoted his experience with a sick child suffering from influenzal meningitis. Serum had been administered during the first stage of the child's illness. When a relapse occurred some apprehension was felt about the administration of the serum, especially when a skin test revealed great sensitivity. The child was therefore given desensitization doses. In the second relapse they had been faced with the problem of a desperately ill child for whom serum appeared to offer the only chance; but again the danger of severe reaction arose. Dr. Southby said that he had discussed the position with Dr. Reginald Webster, and it was decided to give the serum intravenously under anæsthesia. Dr. Southby said that he himself administered a light chloroform anæsthetic whilst his resident medical officer began to administer the 120 millilitres of serum intravenously. Twenty-six millilitres were given without effect. Then, within seconds, the child's colour changed from livid to a diffuse and intense red. It was thought that this represented an anaphylactic reaction; but in a few minutes the colour changed to purple, then became gradually lighter and later mottled, and finally returned to the previous cyanotic pallor. During the whole period the heart rate remained at 120 per minute. The resident medical officer was then advised to administer more serum, and finally all the serum was given without untoward reaction. The patient survived for another thirty-six hours. Dr. Southby said he thought that in view of this experience it was possible to take the risk of giving repeated doses of antiserum to a desperately ill child under anæsthesia. Another interesting feature was the number of children who developed hemiplegia. Previously all these patients succumbed quickly; if they were kept alive for longer periods, sequelæ such as that mentioned were more frequently disclosed.

DR. N. MYERS said that a baby of eleven months had been admitted to the Children's Hospital two or three months earlier with the diagnosis of influenzal meningitis. Treatment was carried out on routine lines, and the baby was discharged from hospital as cured. He was readmitted the same day, but no abnormality was discovered, and after two weeks he was again sent home. Two months later he was admitted for the third time. He again presented clinical evidence of meningitis. No cerebro-spinal fluid was obtained on lumbar puncture, so a needle was introduced into the left lateral ventricle, with the production of thick pus. A similar finding followed the insertion of a needle into the right lateral ventricle, and both specimens of fluid yielded *Hæmophilus influenzæ* on culture. Dr. Myers asked if there was any way of appreciating this complication. The baby was moribund, and the prognosis was very bad indeed. Dr. Myers said that two other patients with influenzal meningitis had been treated with streptomycin, penicillin and antiserum. The cerebro-spinal fluid of both children still had a high cell content after a long period of therapy. Dr. Myers asked what was the next step in the management of these cases.

DR. H. MCLORINAN said that the use of penicillin as a routine measure was unnecessary if the organism was first tested to see whether it was resistant or not. The majority of such organisms were resistant. Thus it was an unnecessary risk to give penicillin intrathecally unless such tests had been first carried out. The literature was full of the risks of giving penicillin intrathecally. At the Queen's Memorial Infectious Diseases Hospital, Fairfield, a number of patients responded to thirty millilitres of serum given intramuscularly, and the sugar content in the cerebro-spinal fluid returned to normal readily. Large doses of sulphadiazine were continued, however. Nevertheless, Dr. Turner's patient appeared to have responded to large doses of penicillin.

Dr. Turner, in reply, said that she was grateful for the complimentary remarks of the various speakers. In answer to Dr. Keogh, she said that the infecting agent had been confirmed as an *Hæmophilus influenzæ* type B by Dr. North. The sensitivity of the strain to penicillin had not been tested. This should have been done. She agreed with Dr. Keogh that there was no evidence of abscess formation. She also believed that no loculation of infection had occurred. She attributed this to heparin therapy. To Dr. Haggar, Dr. Turner said that it was possible to overtreat a patient, and many were overtreated. The cell count should not be a guide to future therapy, as the case under discussion showed. The clinical condition, the temperature and the sugar content of the cerebro-spinal fluid were more reliable

finger-posts. With regard to Dr. Southby's statements concerning the frequent occurrence of hemiplegia in these cases, it was interesting to observe that this child developed hemiplegia at the onset, and not at a later date. Dr. Turner said that she would like to have more data of Dr. Myers's cases, and would prefer to discuss them with him privately In reply to Dr. McLorinan's remarks about the routine use of penicillin, Dr. Turner said that some strains of *Hæmophilus influenzæ* type B responded to penicillin, and others did not. She did not know of any test to discriminate between these groups, except the ordinary sensitivity to penicillin test.

Intussusception Treated by Incision of the Caecum.

DR. BRUCE HALLOWS showed a female baby, aged four months. Three days prior to her admission to hospital she had commenced to have attacks of abdominal pain associated with screaming. The attacks had been infrequent till the last twenty-four hours, but since had been more frequent, though the pain had lessened over the last few hours. The baby was noticeably pale. Twenty-four hours prior to her admission to hospital she had had a convulsive seizure, and since then she had been vomiting increasing amounts and had refused all food. Prior to this her appetite had been good. On April 24, 1947, the fæces were greenish in colour. During the next twenty-four hours they appeared to be fairly normal, but during the preceding twenty-four hours they had been slimy and much more frequently passed, and the last eight stools all contained blood. The child's birth weight was six pounds twelve ounces. Two weeks prior to the onset of her illness her weight was eleven pounds three ounces. Until her illness she had been thriving.

On examination, the baby was seen to be suffering from shock. The temperature was 97·6° F., the pulse rate was 116 per minute and the respirations numbered 32 per minute. The anterior fontanelle was soft and not bulging. Clinical examination of the heart, lungs, central nervous system and skin revealed no abnormality. Examination of the abdomen revealed a large sausage-shaped tumour in the epigastrium and the left iliac fossa. On rectal examination the apex of this mass could be felt, and blood and mucus were present on the examining finger. Pre-operative treatment was by the intravenous infusion of glucose (5%) in saline solution, and later the condition of the child improved to allow of surgical treatment.

The pre-operative diagnosis was intussusception of approximately fifty-four hours' duration. The abdomen was opened through an upper right paramedian incision extending to one inch below the umbilicus. The diagnosis of intussusception was confirmed and simple reduction was easily performed until the last one and a half inches were reached. Great difficulty was then encountered, and during the manipulations the caecum and ascending colon were split for a distance of one and a half inches. The reduction of the intussusception was completed by increasing this split to the neck of the intussusception, and the remaining bowel was then easily reduced from within. Inspection now revealed that the bowel was viable and that the tear was in portion of the mesenteric border of the caecum. This was repaired in two layers in the usual way. The abdomen was closed in layers with catgut; silkworm gut and horsehair were used to close the skin edges, and the abdominal cavity was not drained. After the operation 5000 units of penicillin were given by intramuscular injection every three hours, and glucose (5%) and saline solution were given by continuous intravenous administration. Nothing was given by mouth for the first twenty-four hours. One drachm of *Mistura Chloralis* (Children's Hospital Pharmacopœia) was given every four hours through a Rehfuss tube, which was employed for intermittent gastric suction. Post-operative convalescence was uneventful. The total amount of penicillin given was 430,000 units.

DR. J. G. WHITAKER thanked Dr. Hallows for bringing the subject forward. He said that the case furnished an example of the good work Dr. Hallows was doing in the hospital. In dealing with an intussusception, it was difficult to decide in some cases whether to carry out a resection or to attempt further reduction. No complete answer was yet forthcoming, there being pitfalls both ways. Some of the best work on intussusception had been carried out by the late Major-General Rupert Downes. Over a short period he had successfully carried out resection in three cases of intussusception. The technique employed in these cases was to close the abdomen with the affected loop delivered. This was then dealt with and returned to the abdomen. The decision to carry out resection for intussusception should be made early. In some cases, when the intussusception had been reduced, the bowel lacked lustre and might be dark and atonic. Some of these children would get better if left to recover, but it was a difficult matter to make a quick decision.

DR. DUDLEY HAGGAR said that Dr. Whitaker's mention of General Downes aroused memories of the time when he had assisted General Downes with one of his cases. Dr. Haggar could still clearly remember General Downes putting three through-and-through silkworm gut sutures through the abdominal wall and closing it except for the loop of bowel to be operated on, an immediate improvement being noticeable in the patient.

DR. H. BOYD GRAHAM drew the attention of the meeting to Sir Charles Clarke's book on "The Diagnosis and Treatment of Intussusception". In this book was recorded a case in which resection was successfully carried out by Dr. Hobell Cole. Dr. H. Douglas Stephens had three successful cases to his credit—a performance then unique in the world.

Dr. Hallows, in reply, thanked the various speakers for contributing to the discussion. He said that besides the recognized surgical procedures, less orthodox measures were in use. The gravitational method in which water or salts of heavy metals were used was one of these. One strong objection to this was that one could never be absolutely sure that the intussusception had been completely reduced. Unfortunately intussusceptions had a tendency to recur. Dr. Hallows recalled the clinical history of another child with an intussusception of fifty-four hours' duration. Twenty-four hours after the onset there was a period of twenty-four hours' freedom, and then a recurrence of pain. The intussusception had apparently reduced itself and then recurred. Incision of the bowel had been carried out in this case. On inspection, the bowel was gangrenous, and resection was imperative. Dr. Hallows said that this subject had been raised to assist those present in arriving at some clinical assessment of cases of intussusception, to eliminate waste of time in the treatment of such shocked patients, and to help clinicians to make a definite decision on bowel viability and on whether resection was to follow or not. There was always a danger of supervening peritonitis after the bowel was opened, but this might not be an important added factor, since to a certain extent penicillin was available to assist in its control.

Pathological Exhibit.

DR. REGINALD WEBSTER showed a number of pathological specimens of interest.

Retinoblastoma.

Dr. Webster said that the first specimen shown was presented by way of illustration in the closing chapter of the clinical story of a child, A.S., aged three years, who had been brought before a meeting of the society by Dr. Stanley Williams in April, 1947. It would be remembered that when she was twenty months old the child's right eye had been enucleated in an endeavour to stem the advance of a retinoblastoma, and that at the former meeting Dr. Williams had placed the microscopic section of the tumour on view. When the child died on April 30, 1947, it was anticipated that the post-mortem examination would reveal neoplastic tissue invading the under surface of the frontal lobes and mid-brain by direct extension from the orbit. But it was not so; removal of the orbital plate revealed no sign of tumour growth within the orbital cavity, nor was there any blemish on the basal surface of the brain. It was apparent, however, that a moderate degree of hydrocephalus existed, the cause of which was sought unsuccessfully in a basal plastic meningitis, which, it was considered, might have supervened on the surgical removal of the eye. When the brain was eventually hardened and examined in coronal sections, a cerebral metastasis was disclosed in the thalamus and suprathalamic region, with the attenuated *corpus callosum* stretched over it. The anterior horns of the lateral ventricles were dilated. The presumption was that neoplastic cells had penetrated along the lymph spaces of the optic nerve to pursue the course of the optic radiation. Dr. Webster said that if his information was correct, prognosis after enucleation of the eye might be assessed by the examination of microscopic sections of the optic nerve; discovery of neoplastic cells in the lymph spaces of the optic nerve was a bad omen.

Dr. Webster went on to say that the term "retinoblastoma" had superseded that of "glioma of the retina", for the sound reason that it had not been found possible to demonstrate glial fibrils by any of the accepted methods of impregnation. Well-established facts regarding the tumour were that in over 90% of cases it arose before the fourth year of life, that in over 20% of affected children both eyes were involved, and that the incidence of the growth displayed a strong familial tendency. In this connexion Dr. Webster drew

attention to an interesting comment on inheritance of retinoblastoma which had appeared in the issue of THE MEDICAL JOURNAL OF AUSTRALIA of June 7, 1947. Note was taken of the work of Harold F. Falls, who had investigated the pedigrees of two families, not previously reported, from the files of the University of Michigan Heredity Clinic. In the first family retinoblastoma occurred bilaterally in identical female twins, a phenomenon which would be regarded by geneticists as strong evidence of heredity. This was the third reported instance of the appearance of retinoblastoma in both of identical twins. In the case of the second family, the mother of a child affected with retinoblastoma had herself undergone enucleation of the left eye at the age of three and a half years for "glioma of the retina"; of her own eight children, four had ocular tumours, three dying from the tumour in infancy, and the fourth surviving enucleation of the eye, to bear in the course of time a normal healthy child. That the condition was hereditary seemed beyond doubt, and Falls recommended that parents who had had the misfortune to have a child with retinoblastoma should be urged to discontinue having children. Whether one regarded the growth as a neuroepithelioma, following Flexner, or subscribed to the view of Mallory and others that it was a neuroblastoma of the same nature as the familiar tumours of nervous origin which arose in the *Anlage* of the sympathetic system, notably in the adrenal medulla, it was important to note that histologically it was distinguished by sheets of small round cells, the nuclei of which were naked and devoid of cytoplasm, and by an absence of fibrils. The growth was, of course, locally destructive and invasive, but if unchecked eventually induced metastases in the brain and more distant organs.

Neuroblastoma.

Dr. Webster then showed a photograph of the liver of a girl, aged two years and three months, who had been admitted to the hospital under the care of Dr. Southby on April 18, 1947. It was interesting to note, in view of the subsequent demonstration of metastatic malignant disease in the femoral epiphysis of the left side, that the presenting symptoms and determining factors in the admission of the child to hospital were a limp and a disinclination to walk. The autopsy findings abundantly confirmed the clinical and radiological diagnosis of neuroblastoma, and might be summarized in the following terms: (i) hepatomegaly of truly colossal dimensions; (ii) a large encephaloid and hæmorrhagic tumour, replacing the right adrenal gland, well defined on the lateral aspect, but extending medially into the portal fissure, the prevertebral glands and the retroperitoneal cellular tissue; (iii) skeletal metastases affecting the cranial bones, the second, third and fourth dorsal vertebræ, and the epiphysis of the left femur. By a process of direct extension the neoplasm had bridged the vertebral column and infiltrated through the pancreas in a manner which Dr. Webster said he had not hitherto observed in adrenal neuroblastoma. It seemed remarkable, in view of the mass of tumour tissue on the under surface of the liver and in the portal fissure, that there had not been implication of the bile ducts with consequent obstructive jaundice.

The liver was enormous (weighing 57 ounces), of smooth surface and normal configuration. The viscus was uniformly permeated by neoplastic cells, in a manner comparable only with leuchæmic infiltration. Innumerable greyish-white streaks and dots were discernible; but there was nothing of the nature of raised nodules or bossing to detract from the impeccable smoothness of the organ. It seemed evident that such an effect could have been produced only by penetration of neoplastic cells along every terminal of the portal vein. Dr. Webster said that for those who preferred to think in terms of "Hutchison" and "Pepper" types of adrenal neuroblastoma, this specimen provided an example of the "Pepper" type; but it was to be remembered that there was no essential difference, and nothing to choose, between the two types in the ultimate distribution of their metastases.

An aspect of neuroblastoma which might not be generally appreciated was that occasionally this malign and apparently inexorable neoplasm had been observed to undergo transformation by maturation of the component cells into a benign growth, or even to disappear altogether. Two instances of successful surgical removal of neuroblastoma had fallen within Dr. Webster's experience, details of which were recorded in a report of a meeting of the society, published in THE MEDICAL JOURNAL OF AUSTRALIA of August 14, 1944. H. Gideon Wells, in a survey of congenital malignant neoplasms, had recorded some extremely interesting facts relating to neuroblastoma. It seemed to be established that neuroblastomatous cells, even when malignant in character, might go on to differentiate into mature types of non-malignant cells. An example of such an occurrence had been furnished by Cushing and Wolbach in their report of a case in which a typical malignant neuroblastoma, observed in a boy aged two years, was found ten years later to have become completely differentiated into the histological components of a ganglioneuroma. In Wells's monograph had been included a communication which he received from Dr. Sydney Farber and Dr. Thomas Lanman, of the Children's Hospital, Boston, to the effect that there had passed through that institution several young infants in whom large tumours, proved microscopically to be neuroblastomata, were present; all these infants were alive and well some time later. One baby even had a metastatic nodule in the liver, upon which a biopsy was made; but the child was living and well one and a half years later. Wells also cited E. P. Lehman as having reported the case of a child, aged eleven months, from whom a typical neuroblastoma had been removed surgically. Lehman later reported that the subject of this operation had attained the age of fifteen years and was in perfect health. It appeared therefore that one had to admit the conception of congenital neuroblastoma as a neoplasm, generally malignant, but capable in exceptional instances of maturation, and change to a benign growth, or perhaps of complete disappearance.

DR. ROBERT SOUTHBY said that he had had the unique experience of having two patients with neuroblastoma in the wards; in both instances the condition had had an unusual onset. In one it started with symptoms of hip joint disease—a limp and disinclination to take weight on the left lower limb, along with limitation of rotation and abduction at the hip joint. X-ray examination revealed a doubtful area in the neck of the femur. The diagnosis was soon clarified by the appearance of secondary deposits elsewhere. The other patient was a baby, aged four months, whose illness had begun with signs of obstructive jaundice suggesting rather infective hepatitis. The child remained well for two weeks, but the jaundice persisted. The obstructive nature of the jaundice was confirmed by laboratory tests. Dr. Southby said that he had asked Dr. Russell Howard for a consultation with a view to laparotomy. This revealed a grossly enlarged liver crammed with metastases.

Special Correspondence.

NEW ZEALAND LETTER.

FROM OUR SPECIAL CORRESPONDENT.

Poliomyelitis.—An epidemic of poliomyelitis has been in progress for over three months, 120 cases having occurred in the Auckland district, and a total of about 160 in New Zealand to date. There has been an unusually large proportion of cases with encephalitis, also with muscle spasm, and a low proportion with serious paralysis. There have been seven deaths.

Precautions instituted by the Health Department on December 1 included the closing of schools, banning gatherings of children, the closure of swimming baths, and forbidding swimming on city beaches. In spite of a blazing summer, these precautions have been extraordinarily well observed. Whether respect for authority or fear of the disease counted most is hard to say. Schools may possibly reopen in the South Island early in March. Since the end of December cases have been notably less severe, suggesting a decline in virulence.

Since early in January Kenny technicians have been working in the Auckland Hospital alongside the regular physiotherapists, sharing the patients. All cases have made good progress. The outstanding feature in treatment has been the success of hot packs in relieving muscle spasm and pain in the early stages.

Overseas Travellers.—Mr. W. S. Robertson, orthopædic surgeon, Wellington, was sent to the United States of America in December by the Government to look into matters connected with poliomyelitis. Mr. Douglas Robb, thoracic surgeon, Auckland, leaves in February for the United States of America and the United Kingdom at government request to study cardiac surgery with particular reference to Blalock's operation for pulmonary stenosis. A clinic for congenital heart cases is to be set up in Green Lane Hospital, Auckland, to receive cases from all parts of New Zealand.

The University of New Zealand.—Professor R. S. Aitken, F.R.C.P., Vice-Chancellor-Elect of Otago University, Dunedin, expects to leave his present post of Regius Professor of Medicine at Aberdeen in August, 1948. Professor Aitken is a New Zealander who went to Oxford with a Rhodes Scholarship, and later went to London Hospital and Post-Graduate Hospital at Hammersmith before going to Aberdeen in 1938. (All the four university colleges in New Zealand are appointing full-time principals (or vice-chancellor in Otago).) Sir Thomas Hunter is the Principal in Wellington, and Dr. Hulme has been appointed to Canterbury College, Christchurch. The appointment in Auckland has not yet been made.

The Senate of the University of New Zealand met in Dunedin in January and adopted a report on medical education. The present limit of admission of 120 students *per annum*, with a quota system for the various centres, was sustained; the General Medical Council recommendation of five terms for anatomy and physiology with a subsequent term introductory to clinical work was adopted. The present distribution of final (sixth) year students to the four centres, without substantial development of teaching facilities in any one of the other centres, was confirmed, and a "hospital year" after graduation and before full registration was to be sought from the Medical Council. Certain developments in staffing and building in Dunedin were supported, and post-graduate education was left very much *in statu quo*, that is, in an elementary condition. These decisions were not uncontested: some thought it wrong to deny to properly prepared students the right to study medicine; some wanted the final year students (some indeed half the students in each "clinical" year) massed in one centre away from Dunedin under professorial teaching units; and some wanted a major development of post-graduate effort and clinical research also under university units in another centre. All these things, however, were denied, and the Committee on Medical Education was dissolved.

The Medical School in Dunedin is just completing its third major building to house pathology, animal department, research units and students' health and social study units. Dr. A. S. Moody is the new chairman of the Hospital Board. A new School of Physical Education is opening in 1948 under Mr. Philip A. Smithells, formerly of the Education Department, Wellington.

The Royal Australasian College of Surgeons.—Also in Dunedin, which is celebrating its centennial year, in January, was held the twenty-first annual meeting of the Royal Australasian College of Surgeons under the presidency of Professor Gordon Bell. Sir Hugh Cairns, the first Arthur Sims Commonwealth Travelling Fellow of the Royal College of Surgeons of England, was the visitor and gave the Syme Oration. Sir Charles Hercus and Sir Hugh Cairns were made Honorary Fellows. Fellows from Australia included Mr. Victor Hurley, Mr. W. A. Hailes and Mr. Balcombe Quick.

The British Medical Association.—The biennial conference of the New Zealand Branch of the British Medical Association was held in Dunedin in February under the presidency of Mr. J. A. Jenkins, F.R.C.S., of Dunedin. The Honourable Mabel Howard, Minister of Health, addressed the conference.

Death of Sir Lindo Ferguson.—Sir Lindo Ferguson died in Dunedin in his ninetieth year in January. He had a long and honourable career in the medical school and hospital, being dean of the school from 1916 until Sir Charles Hercus took over.

Correspondence.

THE TREATMENT OF PSYCHOSES AND PSYCHONEUROSES BY ELECTROPLEXY (ELECTRIC SHOCK THERAPY) IN A GENERAL HOSPITAL.

SIR: In your issue of February 21, 1948, there is a letter from Dr. John A. McLuskie on electroplexy. We would be grateful to have the opportunity of thanking him for his expression of appreciation and of explaining his difficulties.

Fifty *questionnaires* were sent out, each asking three questions. 1. Was the patient well and working? 2. Did he consider he benefited by the treatment? 3. Did he consider he did not benefit by the treatment? It will be seen that the number of answers cannot be added.

With regard to the argument that by diagnostic-curative procedures the patient may be given a psychosis, this is definitely not the case. The criteria are the same as for "Pentothal" narcosis in which a degree of confusion reveals underlying conflicts and therefore it becomes an analytical procedure. Surely it cannot be considered that "Pentothal Sodium" in small amounts could produce a psychosis.

With regard to the statement that we have not sufficiently stressed the utility of electroplexy, we considered that the figures were self-explanatory. In our opinion electroplexy is the most important innovation in psychiatry during the last century.

Yours, etc.,
JOHN BOSTOCK.
B. J. PHILLIPS.

Brisbane Clinic,
Wickham Terrace,
Brisbane.
March 4, 1948.

PROMINENCE OF THE EYES IN FATHER AND DAUGHTER.

SIR: Permit me to thank those correspondents who informed me that the prominence of the eyes in father and daughter reported in the issue of January 17, 1948, of THE MEDICAL JOURNAL OF AUSTRALIA was due to oxycephaly. X-ray photographs of the skulls show the condition as such.

Shanks, Kerley and Twining in their textbook of X-ray diagnosis state that the name "tower skull" has been applied to the condition. They quote Grieg as saying that "in its slightest form it attracts attention, while in its grosser forms there is no passer-by but is shocked by the disfigurement and repelled by its hideousness". As with all types of craniostenosis, there is a marked hereditary tendency.

Yours, etc.,
E. A. JOSKE.

Balaklava,
South Australia,
February 23, 1948.

STANDARDS AT THE UNIVERSITY OF SYDNEY MEDICAL SCHOOL.

SIR: Recent graduates in medicine from the University of Sydney will surely be dismayed by the criticism, as reported in the public Press, by two senior members of the medical profession in Melbourne and Sydney: firstly that "they are half baked" and secondly that "they do not come up to the standards of the past".

The achievements of young Australians in post-war years in the field of athletics and other games leave no doubt that the race is improving.

If the examination papers are analysed from first year medicine onwards the impression received is that the standards today are far higher than in the past.

It was my privilege to teach and examine and know students for over thirty years at Sydney Hospital, and such criticism of Sydney medical students and graduates is unjust and unwarranted.

Yours, etc.,
H. BULLOCK.

"Rolna",
Macquarie Street,
Sydney.
March 8, 1948.

A BASIC ROUTINE FOR POST-OPERATIVE TREATMENT AFTER LAPAROTOMY.

SIR: I am very relieved to get Mr. Leo Doyle's reassurance about the superiority of the small intestine as an organ of absorption. The existence of the villi is thus justified.

Mr. Doyle fears that trouble may follow the post-operative use of drinks. But let him put aside Sperling's observations. These concern complete obstruction, a condition altogether different from the usual post-operative state. These fears are not justified by practical experience. Trouble does not follow if the drinks are taken slowly and controlled in quality and quantity. The partially obstructing inflammation in the usual case affects the lower levels of the intestine, in the ileo-caecal region and in the pelvis. The upper levels remain organically normal and snug and unaffected in the left upper quadrant of the abdomen, covered by the posterior parietal peritoneum, the mesocolon, transverse colon and omentum. That the physiological "still-stand" in these upper loops does not prevent their functioning as an organ of absorption is shown by the many patients treated by "elective alimentary rest". These patients must absorb their drinks, because the drinks do not distend their abdomen, they do not become dehydrated, and their

urinary output increases *pari passu* with the gradual increase of fluid intake.

Pathological considerations suggest that the upper unaffected coils should be used for water absorption, and the inflamed coils in the pelvis and ileo-caecal regions should be rested and left undisturbed. Surely the absorption is interfered with more in the inflamed than in the uninflamed coils.

Mr. Doyle has conceded the point in physiology. So it is now clear that when he treats his thirsty patients (and friends) all considerations, physiological, pathological and æsthetic, as well as comfort and convenience, demand that Mr. Doyle, as a basic routine, should use the anterior rather than the posterior route.

Yours, etc.,

235, Macquarie Street, Sydney, March 8, 1948.

V. J. KINSELLA.

Post-Graduate Work.

THE POST-GRADUATE COMMITTEE IN MEDICINE IN THE UNIVERSITY OF SYDNEY.

General Revision Course, 1948.

THE Post-Graduate Committee in Medicine in the University of Sydney announces that the general revision course will begin on Monday, May 24, 1948, and continue for two weeks. The programme will be as follows.

Monday, May 24.—9 a.m.: Registration and address by the chairman, Colonel A. M. McIntosh. 10.15 a.m.: "Thyreotoxicosis", Dr. H. R. G. Poate. 11.30 a.m.: "Cardio-Vascular Disease", Dr. S. A. Smith. 2 p.m.: "Anticoagulants in Surgical Practice", Dr. H. Cummine. 2.45 p.m.: "Anticoagulants in Medical Practice", Dr. A. Morrow. 3.45 p.m.: "Early Post-Operative Ambulation", Dr. J. C. B. Allen.

Tuesday, May 25.—9 a.m.: "Spinal Anæsthesia", Dr. W. I. T. Hotten. 10.15 a.m.: "Physical Medicine", Dr. B. G. Wade. 11.30 a.m.: Clinical demonstration in neurology, Dr. E. Susman. 2 p.m.: "Common Eye Conditions in General Practice", Dr. N. McA. Gregg. 3.15 p.m.: Clinical demonstration (medical), Dr. Kempson Maddox. 4 p.m.: Clinical demonstration (surgical), Dr. R. Flynn.

Wednesday, May 26.—9 a.m.: "Management of Hypertension (Medical)", Dr. T. Greenaway. 9.45 a.m.: "Management of Hypertension (Surgical)", Dr. Rex Money. 10.30 a.m.: "Urinary Incontinence in Women", Dr. A. Duggan. 11.30 a.m.: "Coronary Disease", Dr. E. H. Stokes. 2 p.m.: Psychiatric demonstration, Professor W. Dawson. 4 p.m.: "Surgery of the Breast", Dr. B. T. Edye.

Thursday, May 27.—9 a.m.: "Surgery of the Gall-Bladder", Dr. H. Bullock. 10.15 a.m.: Symposium on antibiotics in medicine, which will include the following: "General" (Professor H. K. Ward), "Hand Infections" (Dr. C. Winston), "Acute Osteomyelitis" (Dr. J. Steigrad), "Tuberculosis" (Dr. C. Bayliss), "Urology" (Dr. J. Laidley), "Pædiatrics" (Dr. Lorimer Dods), "General Medicine" (Dr. M. Joseph), Questions and Answers. 12 noon: "The Antihistamine Drugs", Dr. A. Morrow. 2 p.m.: "Fractures in General Practice", Dr. L. Buchanan. 2.45 p.m.: "Fractures in General Practice", Dr. R. Graham. 4 p.m.: "Reparative Surgery", Dr. K. Starr.

Friday, May 28.—9 a.m.: "Rheumatic Fever", Dr. R. A. R. Green. 10.30 a.m.: "Advances in Pædiatrics", Dr. Lorimer Dods. 11.45 a.m.: "Common Surgical Conditions in Infancy and Childhood", Dr. J. Steigrad. 2 p.m.: "Appropriate Ages for Surgical Procedures", Dr. T. Y. Nelson. 3.30 p.m.: "Abdominal Pain Associated with Surgical Conditions in Infancy and Childhood", Dr. C. Wesley. 4.45 p.m.: "Tuberculosis in Infancy and Childhood", Dr. W. MacCallum. Film evening.

Saturday, May 29.—9 a.m.: "Management of Sterility", Dr. Bruce Hittman. 9.55 a.m.: "Obstetric Forceps: Their Indication and Application", Dr. Gordon Lowe. 10.50 a.m.: "The Full Scope of Ante-Natal Treatment", Dr. Ida Saunders.

Monday, May 31.—9 a.m.: "The Acute Abdomen", Dr. V. M. Coppleson. 10.30 a.m.: "Carcinoma of the Stomach", Dr. V. Kinsella. 11.30 a.m.: "Anæmia", Dr. R. Jeremy. 2 p.m.: "Brachial and Sciatic Neuritis", Dr. I. Miller. 3 p.m.: "Peptic Ulcer", Dr. Bruce Hall. 4.15 p.m.: "Relaxing Agents: Curare *et cetera*", Dr. S. Marshall.

Tuesday, June 1.—9 a.m.: "Intravenous Anæsthesia", Dr. H. Daly. 10 a.m.: "Common Nervous Conditions", Dr. K. Noad. 11.15 a.m.: "Common Skin Diseases", Dr. R. B. Perkins. 12 noon: "X-Ray Interpretation in General Practice", Dr. D. Maitland.

Wednesday, June 2.—9 a.m.: "Diabetes", Dr. W. W. Ingram 10 a.m.: "Common Ear, Nose and Throat Conditions", Dr. E. Blashki. 11.15 a.m.: "Treatment of Burns", Dr. E. Loewenthal. 2 p.m.: "Thoracic Disease", Dr. C. Bayliss. 3 p.m.: "Surgical Cases and Thoracic Disease", Dr. M. Susman. 4.30 p.m.: "Allergy", Dr. Bernard Riley. 8 p.m.: Post-Graduate Annual Oration—"The Life and Work of Sir Thomas Anderson Stuart", Sir Charles Bickerton Blackburn, Great Hall, University of Sydney.

Thursday, June 3.—9 a.m.: "Head Injuries", Dr. G. Phillips. 10 a.m.: "Observations on Acute Intestinal Obstructions", Dr. T. M. Furber. 11 a.m.: Clinical demonstration, Professor C. G. Lambie. 2 p.m.: Clinical demonstration (medical), Dr. W. Evans. 3.15 p.m.: Clinical demonstration (surgical), Dr. R. J. W. Malcolm. 4.30 p.m.: Clinical demonstration (gynæcological), Dr. H. K. Porter.

Friday, June 4.—9 a.m.: "Infant Feeding and Care of New-Born Child", Dr. S. Stening. 10 a.m.: "Toxæmias of Pregnancy", Dr. T. Dixon Hughes. 11 a.m.: "Indications for and Methods of Cæsarean Section", Dr. J. Chesterman. 2 p.m.: "Clinical Indications for the Use of Œstrogens in Gynæcology", Dr. F. A. Maguire. 3 p.m.: "Modern Management of Some Obstetric Problems", Professor B. Mayes. 4 p.m.: "Rh Factor", Dr. Mary Heseltine.

Enrolments.

The fees for the complete course will be £5 5s.; afternoons only or half course, £3 3s. Applications should be lodged with the Course Secretary, 131, Macquarie Street, Sydney, telephone B 4606 or BW 7483.

Seminar in Medical Statistics.

The Post-Graduate Committee in Medicine in the University of Sydney announces that Dr. H. O. Lancaster will conduct a seminar in medical statistics on Wednesday, April 14, 1948, at 5.45 p.m., at the School of Public Health and Tropical Medicine, University Grounds. The subject of the seminar will be "Tuberculosis Trends in Australia", and those interested are welcome to attend.

Correspondence Course in Advanced Medicine.

A correspondence course in advanced medicine suitable for general practitioners has now been instituted by the committee. The course, which is divided into five sections, consists of extracts and articles of medical subjects from current literature and is intended to cover all systems. It may be taken over a period of twelve months, the fee being £10 10s.

Further information may be obtained on application to the Course Secretary, the Post-Graduate Committee in Medicine, 131, Macquarie Street, Sydney. Telephones: BW 7483, B 4606.

Australian Medical Board Proceedings.

QUEENSLAND.

THE undermentioned have been registered, pursuant to the provisions of *The Medical Acts, 1939 to 1946*, of Queensland, as duly qualified medical practitioners:

Nadel, Henry, M.D., 1930 (Univ. Genoa), c.o. Union Bank of Australia, Pitt and Hunter Streets, Sydney.

Colville, James Robertson, L.R.C.P. (London), 1929, "Craigie", Rome Street, Yeronga, Brisbane.

Fitzhenry, June Snowden, M.B., B.S., 1947 (Univ. Sydney), c.o. District Hospital, Wallumbilla.

Degotardi, John Charles, M.B., B.S., 1947 (Univ. Sydney), c.o. Hospitals Board, Rockhampton.

Newell, Andrew Colgate, M.B., B.S., 1944 (Univ. Melbourne), R.A.A.F. Station, Garbutt, Townsville.

Flint, Colin Watson, M.B., B.S., 1948 (Univ. Queensland), 271, Cavendish Road, Coorparoo.

Rawle, Kenneth Thomas, M.B., B.S., 1947 (Univ. Sydney), Mater Hospital, South Brisbane.

Ryan, Thomas Joseph, M.B., B.S., 1948 (Univ. Queensland), "Kingewood", Camona Street, Kelvin Grove, Brisbane.

Todd, Ronald Thomas, M.B., B.S., 1948 (Univ. Queensland), "Wahroonga", Watson Street, Wilston.

White, Henry Bysshe, M.B., B.S., 1948 (Univ. Queensland), 28, Hazelwood Road, New Farm.

The following additional qualifications have been registered:

Willmer, Neville Beaumont, 27, Caledonian Hill, Gympie, D.T.M., D.T.H. (Univ. Sydney), 1946.

University Intelligence.

THE UNIVERSITY OF MELBOURNE.

THE BEATTIE SMITH MEMORIAL LECTURES.

THE Beattie Smith Memorial Lectures, endowed by a benefaction received by the University of Melbourne in 1922 under the will of the late Dr. William Beattie Smith, are to be delivered this year by Dr. Alan Stoller, M.R.C.S. (England), L.R.C.P. (London), D.P.M. (England), specialist in medical psychology, Repatriation Commission Headquarters, Melbourne, on Monday, April 19, and Monday, April 26, in the Anatomy Lecture Theatre, University of Melbourne.

The subject of the lectures will be "Social Health and Psychiatric Service". Professor P. MacCallum, Dean of the Faculty of Medicine, will preside at both lectures, which will commence at 8.15 p.m.

Obituary.

LEON OPIT.

WE regret to announce the death of Dr. Leon Opit, which occurred on March 10, 1948, at Adelaide.

BERNARD MOORE SAMPSON.

WE regret to announce the death of Dr. Bernard Moore Sampson, which occurred on March 10, 1948, at Manly, New South Wales.

Nominations and Elections.

THE undermentioned has applied for election as a member of the South Australian Branch of the British Medical Association:

Seppelt, Yvonne Granville, M.B., B.S., 1946 (Univ. Adelaide), 43, Glenunga Avenue, Glenunga.

Books Received.

"Essentials of Fevers", by Gerald E. Breen, M.D., B.Ch. (N.U.I. Dub.), D.P.H., D.O.M.S. (R.C.P. London, R.C.S. England); Second Edition; 1948. Edinburgh: E. and S. Livingstone, Limited. 7¼" × 4¾", pp. 366, with many illustrations, most of them coloured. Price: 15s.

"Gardiner's Handbook of Skin Diseases", by John Kinnear, O.B.E., T.D., M.D., M.R.C.P. (Edinburgh), D.L.; Fifth Edition; 1948. Edinburgh: E. and S. Livingstone, Limited. 7¼" × 5", pp. 266, with many illustrations, most of them coloured. Price: 15s.

"Diseases of the Nose, Throat and Ear: A Handbook for Students and Practitioners", by I. Simson Hall, M.B., Ch.B., F.R.C.P.E., F.R.C.S.E.; Fourth Edition; 1948. Edinburgh: E. and S. Livingstone, Limited. 7¼" × 4¾", pp. 476, with many illustrations, some of them coloured. Price: 15s.

"Medical Cases Described for Nurses: An Introduction to Clinical Medicine for Nurses", by S. Locket, M.B., B.S. (London), M.R.C.P. (London); 1948. Edinburgh: E. and S. Livingstone, Limited. 7¼" × 4¾", pp. 96. Price: 6s.

"Pathological Histology", by Robertson F. Ogilvie, M.D., F.R.C.P. (Edinburgh), F.R.S.E., with a foreword by A. Murray Drennan, M.D., F.R.C.P. (Edinburgh), F.R.S.E.; Third Edition; 1947. Edinburgh: E. and S. Livingstone, Limited. 8½" × 5½", pp. 470, with many coloured illustrations. Price: 37s. 6d.

"The Essentials of Modern Surgery", edited by R. M. Handfield-Jones, M.C., M.S., F.R.C.S., and A. E. Porritt, C.B.E., M.A., M.Ch., F.R.C.S.; Third Edition; 1948. Edinburgh: E. and S. Livingstone, Limited. 9½" × 6", pp. 1276, with many illustrations. Price: 50s.

"Children's Eye Nursing", by James Hamilton Doggart, M.A., M.D. (Cantab.), F.R.C.S. (England); 1948. London: Henry Kimpton. 7¼" × 4¾", pp. 160, with many illustrations, some of them coloured. Price: 8s. 6d.

"Drugs from Plants", by Trevor Illtyd Williams, B.A., B.Sc., D.Phil.; 1947. London: Sigma Books, Limited. Sydney: Walter Standish and Sons. 7¼" × 5", pp. 120, with illustrations. Price: 6s.

Diary for the Month.

MARCH 24.—New South Wales Branch, B.M.A.: Annual Meeting.
MARCH 24.—Victorian Branch, B.M.A.: Council Meeting.
MARCH 30.—New South Wales Branch, B.M.A.: Council Meeting (election of officers).
APRIL 1.—South Australian Branch, B.M.A.: Council Meeting.
APRIL 2.—Queensland Branch, B.M.A.: Branch Meeting.
APRIL 6.—New South Wales Branch, B.M.A.: Organization and Science Committee.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Honorary Secretary, 135, Macquarie Street, Sydney): Australian Natives' Association; Ashfield and District United Friendly Societies' Dispensary; Balmain United Friendly Societies' Dispensary; Leichhardt and Petersham United Friendly Societies' Dispensary; Manchester Unity Medical and Dispensing Institute, Oxford Street, Sydney; North Sydney Friendly Societies' Dispensary Limited; People's Prudential Assurance Company Limited; Phœnix Mutual Provident Society.

Victorian Branch (Honorary Secretary, Medical Society Hall, East Melbourne): Associated Medical Services Limited; all Institutes or Medical Dispensaries; Australian Prudential Association, Proprietary, Limited; Federated Mutual Medical Benefit Society; Mutual National Provident Club; National Provident Association; Hospital or other appointments outside Victoria.

Queensland Branch (Honorary Secretary, B.M.A. House, 225, Wickham Terrace, Brisbane, B.17): Brisbane Associated Friendly Societies' Medical Institute; Bundaberg Medical Institute; Brisbane City Council (Medical Officer of Health) Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 178, North Terrace, Adelaide): All Lodge appointments in South Australia; all Contract Practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 205, Saint George's Terrace, Perth): Wiluna Hospital; all Contract Practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

Editorial Notices.

MANUSCRIPTS forwarded to the office of this journal cannot under any circumstances be returned. Original articles forwarded for publication are understood to be offered to THE MEDICAL JOURNAL OF AUSTRALIA alone, unless the contrary be stated.

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Members and subscribers are requested to notify the Manager, THE MEDICAL JOURNAL OF AUSTRALIA, Seamer Street, Glebe, New South Wales, without delay, of any irregularity in the delivery of this journal. The management cannot accept any responsibility or recognize any claim arising out of non-receipt of journals unless such notification is received within one month.

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